AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 8 JUNE, 1925 No. 6

GONIOSCOPY AND ITS CLINICAL APPLICATIONS.

MANUEL URIBE TRONCOSO, M.D.

NEW YORK CITY.

The gonioscope here described is adapted to examine all parts of the angle of the anterior chamber in all eyes. The appearances it reveals in the normal eye are described including the iris, ciliary body, sclerocorneal junction, inner surface of cornea and limbus and the pupil. Cases are reported illustrating pathologic conditions of pigmentation, high myopia, atrophy of iris and ciliary body and ciliary processes, iritis, glaucoma, and following operations involving the iris and chamber angle.

The examination of the angle of the anterior chamber, or gonioscopy*—deserves a place in the routine examination of the eyeball, after the ophthalmoscope and the tonometer. The region of the angle normally invisible by the opacity of the scleral limbus, is easily observed with the new contact glasses of Salzmann and Koeppe. (Fig. 1.) Both of them

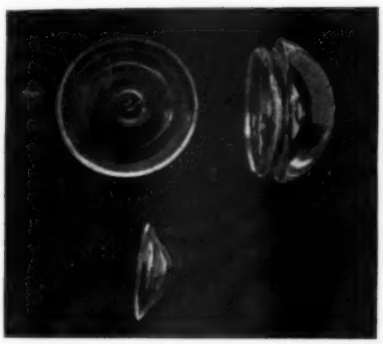

Fig. 1.—Above. Front and side view of Koeppe's contact glass. Below side view of Salzmann contact glass. (About three-fourths natural size.)

can be used with the electric ophthalmoscope, inserting a +20 lens behind the aperture, giving good views. However, with this method the nasal part of the angle is the only region readily accessible. The shape of the ophthalmoscope makes its use difficult above the nose for the inspection of the temporal side of the angle, and above and below the orbit for the opposite sides of the angle.

The magnification obtained with the Koeppe contact glass is small (3 diameters) and generally insufficient to detect minute pathologic changes. The Salzmann glass gives much larger magnifications and excellent views with a deep anterior chamber, but when this is shallow the field is greatly obstructed by the lesser circle of the iris; the observer's line of vision being confined to a plane strictly tangent to the iris. As the illuminating beam and the image forming rays follow the same path, they interfere with each other and the image is not free from fog (Koeppe). With Koeppe's contact glass a perfect, clear view of the angle is obtained in a panoramic way, even with a flash light. In the optical zone the path of the incoming and emergent rays is different, and the spherical aberration considerably less.

With the slit lamp and the Koeppe glass magnifications as large as 40 diameters can be obtained. Unfortunately the technic is long, difficult, and needs considerable practice. Moreover the nasal and temporal sides of the angle are only available to observation.

Hoping to obtain a clear, unobstructed view of the angle in all directions and a sufficient magnification, I have devised and perfected a new instrument, the gonioscope, which is a microscope and a periscope combined. It has been built by Bausch & Lomb Optical Co. with great care and accuracy. (Fig. 2.)

The tube of the microscope C. A. has a length of 0.23 cm. and revolves around its axis inside of a looped band D which is attached to the handle of the instrument, J. The handle is at right angles to the tube. Inside of this handle a sufficient space for a dry battery has been reserved. One end of the tube is conical and carries the objective lens and a

*The term "Gonioscopy" suggested by the author in 1921, has been adopted by Salzmann in the last edition of Fuchs' Textbook of Ophthalmology, 1924.

square prism, A, thru which the rays of light coming from the angle and parallel to the surface of the iris, are totally reflected and sent to the optical system in the tube, allowing the observer to place himself in front of the patient. Two interchangeable eye pieces give magnifications of 10 and 20 diameters. The rotation of the microscope tube around the eye brings into view the structures of the angle all around the limbus. This periscope arrangement gives the observer a much more comfortable position than the lateral view which the use of the ophthalmoscope entails.

The illumination of the angle is made by a small electric lamp, L, carried in a tube and fastened alongside the conical end of the microscope. The lamp is provided with a condensing lens and the rays of light are sent at right angles to the tube by means of a square prism, B, parallel and on the same level with the square prism of the microscope.

In order to keep the electric contact when the gonioscope revolves, the tip of the lamp carrying shaft, F, slides around a metallic plate connected with the dry battery.

Focussing was at first made by changing the distance between the objective and ocular, but we soon found that the slight movements transmitted to the instrument by sliding the ocular piece, caused a change in the place spotted and a blurring of the image, due to the displacement of the microscope. We then decided to have the ocular and object lens stationary, and regulate the focussing by approaching or separating the tip of the gonioscope from the eye.

A stationary instrument was not considered, the purpose being to devise a practical portable instrument, with the same advantages as the ordinary electric ophthalmoscope.

The gonioscope could have been

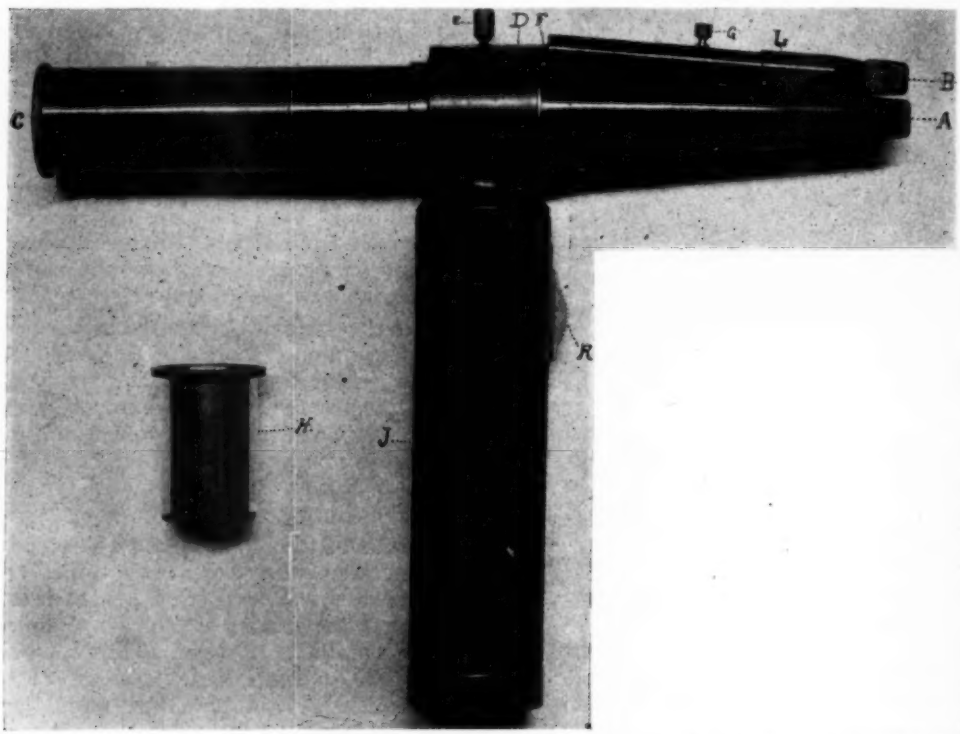

Fig. 2.—Side view of the gonioscope. CA, tube of the microscope ending in the square prism A. FB, tube carrying the lamp at L and ending in the square prism B. G, screw for moving the lamp inside the tube, F, shaft for keeping the electric contact when the microscope revolves around the ring D. E, screw for fixing the tubes in position. R, rheostat controlling the amount of illumination from the battery J. H, high power ocular.

made lighter by using a smaller dry battery, but the illumination required in the angle being necessarily strong, since a great amount of rays are lost by reflection and by refraction thru the contact glass, a heavier battery was important.

The gonioscope, like the ophthalmoscope, requires a complete training for obtaining: first, a clear, sharp view of the angle; second, for recognizing the different structures, their places, positions and variations, and third for correctly interpreting the pathologic changes. Therefore it is necessary to be perfectly acquainted with the physiologic angle and its anomalies, before venturing on the detection of disease.

THE CONTACT GLASS.

Prior to describing the technic of the gonioscope itself, some explanation of the application of the contact glass will be useful. The Koeppe contact glass is the only one which can be used with the gonioscope, the Salzmann glass not being suitable for focal illumination. The Koeppe glass is more conveniently applied with the patient lying on his back. In this position it is easier to fill the chamber with saline solution, and there is less danger that the glass may slide and be broken on the floor; a loss to be considered, because the contact glasses are quite expensive.

Two or three drops of holocain in 1% solution, are instilled. The glass is held between the thumb and index finger of the left hand and the patient instructed to look down; then the glass is inserted below the upper lid, whose edge must exactly fit into the groove at the periphery of the glass. The patient is then directed to look straight up and the glass is pushed below the lower lid, which the right thumb separates from the eye and aids to fit into the corresponding groove. There remains now between the cornea and the glass a space which should be filled with physiologic salt solution. The author uses a dropper with a flattened end, or an ear rubber syringe, whose tip is inserted below the border of the glass, which the thumb and index of the left hand have not abandoned.

To facilitate this maneuvre the head of the patient is tilted toward his right when the right eye is examined, and toward the left when the left eye is examined. Gently lifting the glass in its inner or nasal border with the fingers, by a pressure of the rubber bulb with the right hand the liquid is injected into the chamber, taking good care that the air bubbles are thoroly expelled. This somewhat difficult task is easily accomplished by the lateral position of the cornea and contact glass, which the turning of the head has brought about. As soon as the air is wholly expelled the head is turned to its former position, and the glass gently pressed upon the eyeball to obtain a perfect adhesion of its borders. It is very important to keep it in the same position, always parallel to the cornea, as any slight lateral movement will give entrance to an air bubble and require a new turning of the head and refilling of the chamber, with the corresponding loss of time.

For the fixation of the glass Koeppe uses a strip of bandage tied around the head and provided with a knot which fits into the central hole. This method, perhaps convenient for the slit lamp where the illumination is projected in a lateral way only, can not be employed with the gonioscope, in which the examination is made all around the limbus. Instead of the bandage, the author has devised a head band (Fig. 3) which bears in the center a horizontal bar on which a carrier with a movable arm and a shaft ending in a ball can be slid over each eye. The ball fits into the hole of the contact glass and presses it down evenly, keeping the edges in contact with the sclera and avoiding the entrance of air bubbles. The carrier is fastened to the bar with a screw.

USING THE GONIOSCOPE.

The gonioscope firmly held with the right hand, is placed in a position opposite to the part to be explored. The tip of the instrument is held between the thumb and index of the left hand, the three other fingers resting upon the temple of the patient and firmly supporting the instrument.

Before looking into the microscope it

it advisable to direct the beam of light on a plane parallel to the surface of the iris, which will be brilliantly illuminated. Even with the naked eye it is then possible to observe thru the contact glass the inner part of the sclera and the root of the iris, slightly magnified. Placing now his eye on the microscope, the observer sees a blurred image of the angle which is brought to a sharp focus by slight movements to and from the angle, until a bright, perfectly defined image is obtained. The focal distance is about 30 mm. for both 10 and 20 magnifications.

Fig. 3.—Position of the gonioscope for the examination of the superior nasal part of the angle. The Koeppe contact glass is held upon the eye by the curved bar attached to the head band.

The tip of the instrument is placed at this distance from the contact glass, and the fingers steadied on the temple for the examination of the nasal part of the angle of the right eye. For the

temporal side the tip of the gonioscope is rotated with the fingers and held near the side of the nose, the supporting fingers of the left hand stretching above the contact glass and moving the instrument back and forth to a fine adjustment. For the upper angle the tip is placed near the cheek, and for the lower part of the angle above the forehead, always supported by the left hand, the observer keeping the same position at the side of the patient.

For the left eye either the gonioscope is held with the left hand and the tip of the instrument is supported by the thumb and index of the right hand, or the gonioscope is held with the right hand and the observer moves himself to a position perpendicular, instead of alongside the patient's body, and rotates the microscope accordingly.

The tube of the microscope should be at a right angle with the face for the examination in a plane parallel to the iris, but when a view of the ciliary body in the recess of the chamber is desired, the ocular end of the tube should be tilted toward the side of the observed angle. Some practice is required for getting and keeping in view the different structures; but once this is acquired the examination is easier and rapid.

In order to get accustomed to the different steps of the method, especially for focussing, it is advisable to paste a small band of paper containing one or two words printed in very small type inside of the contact glass, immediately below the projecting rim into which the superior or corneal curvature ends. The contact glass is then placed upon a table, and the gonioscope tried until a clear image of the letters is possible. It will be noticed that this image is inverted in a lateral direction, but not up and down.

The gonioscope has the great advantage of giving a view of the angle not only in a plane parallel to the iris, but slightly elevated. By moving the instrument upwards the line of vision reaches the innermost recesses of the angle, exposing the whole surface of the ciliary body. This can not be accomplished with Salzmann's contact glass and the ophthalmoscope, the line of vision being always parallel to the iris.

The higher magnification of the gonioscope must be reserved for special cases. It requires a strong illumination with a fresh battery, and the field is smaller.

THE NORMAL ANGLE.

The principal landmarks in the picture of the angle are the pupil on one side and the cornea on the other. In order to orientate himself, the observer should undertake the examination in a systematic way as follows (Fig. 4):

1st. The pupillary zone of the iris.
2nd. The surface of the iris.
3rd. The ciliary border or visible limit of the iris.
4th. The ciliary body.
5th. The sclerocorneal trabeculum (ligamentum pectinatum), covering the Schlemm canal (zone of Schlemm).
6th. The inner part of the scleral limbus.
7th. The inner concave dome of the cornea.
8th. The optical section of the cornea.

1st. The pupil appears nearly in half, its size increasing or decreasing with the position of the instrument. Beyond the pupil we find: 1st a colored, abruptly rising slope, the pupillary zone of iris, bound by a more or less elevated, wavy ridge; the lesser circle. In the surface of this zone and sometimes also in the outer edge of the ridge, dark, pitlike depressions, the pupillary crypts, are clearly visible (Figs. 5 and 7).

2nd. The radiating markings of the iris are rarely to be seen (Fig. 5), but the contraction folds in the periphery are clearly outlined, the elevated portions of the folds being darker in color and the furrows lighter. The peripheral crypts described by Fuchs are often visible, particularly in light iris. (Fig. 5.)

3rd. Farther away the iris ends in a sharp wavy line, the ciliary border for last roll of the iris. In it and on the adjacent surface of the iris there are often straight, indented elevations, the iris processes described by Salzmann (i. pr.) (Figs. 5, 7, 8). With the Koeppe glass these iris spurs are only visible

when they arise near the ciliary border, because the iris surface is seen a little from above. With the Salzmann glass, on the other hand, they are very apparent, the line of vision being tangent to the iris; which makes every relief in the membrane appear very distinct. I must state here that I have never been able to observe the long tortuous iris processes passing as a bridge over the ciliary body and connecting the iris surface with the sclerocorneal trabeculum, as described by Salzmann.

4th. As the semischematic section (Fig. 4) clearly shows, the root of the iris is not inserted directly to the sclera but to the anterior and inner part of the ciliary body, which really forms the angle of the anterior chamber. The ciliary body appears in the picture as a narrow dark gray, light dark brown zone immediately bordering the iris; its color changing according to the color of the iris and the complexion of the patient. Its structure is homogeneous or with some striations. The breadth may be uniform or change in different parts of the angle (CB—Figs. 4, 5, 6, 8, and 11). By slightly lifting and tilting the gonioscope it is possible to examine this dark concave sinus, which lies in a deeper plane than the iris, and whose outer limit rises to meet the sclera. The ciliary body becomes inserted by a straight way, slightly irregular or indistinct border. (Figs. 5, 6, 7, and 11.) The contrast between the dark brown color of the ciliary body and the bright sclera is always striking.

In young normal eyes the ciliary body is easily seen. In old persons, however, the anterior chamber may be so shallow, by the elevation of the lesser circle and border of the iris, that it becomes partly or totally invisible. In this case it can only be detected after the use of eserin. (Figs. 10 before, and 11 after eserin.) When iris processes exist in the ciliary border of the iris they may conceal in part the ciliary body, as in Fig. 8. In some cases the ciliary body is limited anteriorly by a narrow brilliant white line which corresponds to the scleral spur (Koeppe) (Fig 13).

5th. Next to the ciliary body there is generally a grayish or grayish pink band, about 2 mm. wide, and broader than the ciliary body. (Figs. 5, 6 and 11.) This is the sclerocorneal trabeculum or ligamentum pectinatum, which covers the Schlemm canal and is made of a close network of interlacing fibers. Its outer border is in some eyes clear cut and sharply limited from the white sclera (Figs. 5, 6, 11) or it may be bordered by a narrow, brilliant white line (Fig. 6). Sometimes it is indistinct and blends gradually into the sclera. Very often this grayish stripe, which may be called the Schlemm zone to indicate its position, does not exist, and the white sclera begins immediately outside the ciliary body.

In some of the normal eyes, especially when congested, one or two bright red, narrow lines, appear bordering the Schlemm zone on either side. (Fig. 8.) They are more conspicuous with the high power ocular, and are due to a small amount of blood circulating inside of the Schlemm canal; the blood collecting near the walls. Salzmann has seen the canal entirely filled with diluted blood and looking like a pinkish stripe, in a case of tuberculous iritis; but normally the grayish color of this zone is a proof that the lumen is filled with a colorless fluid; the aqueous humor.[9] Never have I been able to see the whole Schlemm zone of a red blood color, which would certainly be the case if it were a venous sinus, as reported by Leber and his school. On the other hand any small new formed vessel in the angle is clearly seen with its proper bright red color.

6th. The white zone is the last region of the angle proper and corresponds to the inner part of the sclera and the sclerocorneal junction. Its width is generally double or triple that of the Schlemm zone. It varies with the position of the gonioscope appearing large when the line of vision remains parallel to the iris surface (Fig. 7), and shorter when the instrument is raised, especially if the anterior chamber is shallow. (Fig. 11.) As the width of the scleral zone is of importance in pathologic conditions (glaucoma), it is necessary to familiarize oneself with

its relative size in normal eyes, under varying conditions.

This white zone is limited in the upper part by an indistinct border formed by the bias of the edge of the sclera as seen thru the transparent cornea, which it overlaps exteriorly. This ill defined, veiled border is curved in a low arch whose apex is always in the center of the gonioscopic field. In some patients numerous meridional fine vessels can be seen in this border branching toward the cornea. They have been observed by Koeppe with the slit lamp. He considers them as the last scleral branches of the rami recurrentes anteriores of the anterior ciliary vessels; but warns against mistaking them for the external limbus capillary loops, which are occasionally visible thru the whole corneal thickness.

7th. The inner surface of the cornea appears as a transparent, bluish or grayish crescent, blending gradually with the white sclera in its inner side and sharply limited outside by the:

8th. Optical Section of the cornea. The observer has an illusion of seeing a microscopic section of the cornea, whereas in reality he is looking thru the thickness of the convex border of the membrane.

Outside of the cornea the contact glass appears as a colored, pinkish or brownish crescent, with indistinct shadows and colors.

THE CILIARY PROCESSES AND THE ORA SERRATA.

In patients suffering with irideremia or after an iridectomy, the ciliary processes and the region beyond, to the ora serrata, become perfectly visible with the gonioscope. The processes are seen not entirely in front but from a lower plane, their tips and the inner surface of the *pars ciliaris retinae* being easily followed to the *ora serrata*. Fig. 9 shows the normal ciliary processes in a case of intraocular foreign body, for whose extraction an iridectomy was done. The processes are long, straight prolongations of different shapes and breadths, club like, curved at the base, or branching like an inverted ʎ. The color is dark yellow, the prominences being lighter. They are widely separated by dark brown interspaces. Below the line of processes the orbiculus ciliaris is visible as a narrow black zone ending abruptly in a jagged line, the ora serrata.

In pathologic conditions, the size shape and color of the processes change. They may look like teeth, rounded or pointed in its lower part, where they are widely separated from each other, or they may be triangular, quadrangular or tongue like. Sometimes one, two or three rows of processes can be detected (Fig. 31, plate 12, to the right of the picture) some being merely small plica ciliaris. Generally from five to seven are visible in the coloboma.

SENILE CHANGES.

PIGMENTATION. Pigment is found in the angle as a senile condition, by degeneration of the uveal tract and in glaucoma.

Case 1. *Senile pigmentation.* Figs. 10 and 11 show the nasal angle of the left eye of Mrs. R. M. 49 yrs. old, before and after the use of eserin. The patient had slight hypermetropia and astigmatism and complained of severe headaches, which were relieved in part by the use of proper glasses. The bulbar conjunctiva was congested, pupils small, and shallow anterior chambers. Fundi were normal, and tension with Schiötz in the R. E.=19 mm. and in the L. E.= 18 mm. The gonioscope shows a prominent lesser circle of the iris, no ciliary body and a striking pigmentation made of black dots, arranged in arched lines upon the gray Schlemm zone. After using eserin the stretching of the iris uncovered the ciliary body which is inserted to the sclera in a wavy line, and appears narrower in the center of the picture than in the ends. The pigment reaches the ciliary body. Another irregular spot of pigment is seen in the upper part of the picture covering the Schlemm zone. With Salzmann's contact glass and the electric ophthalmoscope the lesser circle was so high and thick that all the angle was concealed. No pigmentation, Schlemm zone, or ciliary body were visible.

In old persons (rarely in adults) the Schlemm zone has sometimes a light brown color, due to the deposit of yel-

lowish pigment (similar to that in Fig. 13). It is important for diagnostic purposes to distinguish this zone from the ciliary body itself. Occasionally pigment is deposited in black grains or streaks forming two or three straight continuous lines parallel to each other, running in a meridional direction and covering the upper border of the Schlemm zone and the sclera, as described by Salzmann.

PATHOLOGIC CONDITIONS.

Degeneration and atrophy of the root of the iris and ciliary body are easily observed with the gonioscope. Pigment appears in the iris surface in cases of atrophy of this membrane after iritis, as in Fig. 26, alongside of grayish white patches of degeneration of the stroma.

CASE 2. *High myopia. Total detachment of the retina.* Fig. 12, belongs to a man about 60 yrs. old suffering from a total detachment of the retina in the R. E. due to high myopia, and a marked iridodonesis. The lens was still in place but the slackening of the zonule was so great, that in the recumbent position the middle of the surface of the iris was greatly depressed, the pupillary zone and the root of the membrane being in a higher plane. This could be easily detected thru the Koeppe glass using only a flash light. With the gonioscope the pupillary zone had a dark green shade, while in the middle the iris was discolored, and white projecting ridges were very apparent. A third zone, made by the root of the iris, had a homogeneous whitish red coloration, abruptly limited from the middle portion and from the ciliary body, and with some small vessels running parallel to the borders. The contraction folds characteristic of this zone did not exist. The ciliary body was broader, due to the opening of the angle, and had a light brown color. The Schlemm zone was of a pale grayish color with a clear cut, wavy outline.

The white red band undoubtedly represents a zone of iris atrophy from which the pigment has entirely disappeared and all markings are leveled. The reddish color is due to some small vessels still remaining in the stroma; those visible near the borders being probably of a new formation. In this case the degeneration beginning in the ciliary body and zonula, has extended to the root of the iris. Why this whitish stripe ends so sharply in a distinct border I am not prepared to say.

CASE 3. *Atrophy of the iris and ciliary body.* Mrs. L. A. 47 yrs. old had a luetic infection many years before. Wassermann was still positive. The right fundus revealed the characteristic changes of a disseminated choroiditis in the last stages, with big lumps of pigment scattered over the whole fundus. The disc was pale yellow as the result of postchoroiditic atrophy. Myopia of high degree. In the left eye the myopia was lower and the papilla and fundus not involved. Both eyes present to the gonioscope numerous beautiful spots of iris atrophy of a white color, with the normal markings of the surface thinned and very distinct. In the right angle (Fig. 13) the ciliary body was broader than normal and had a peculiar violet grayish color. The Schlemm zone was wide, of a light brown color and separated from the ciliary body by a narrow brilliant white line, the scleral spur.

CASE 4. Fig. 14. *Atrophy of the ciliary processes.* Angle of the R. E. of a woman 67 yrs. old operated for cataract. The coloboma is wide, without any traces of secondary membrane. The ciliary body is very broad above and to the sides of the coloboma, due to the flattening of the iris by the absence of the lens. The excised root of the iris is seen as a white broad line of not cicatrized tissue, above the ciliary processes, which are distinctly small and atrophic, with wider interspaces. The *orbiculus ciliaris* appears behind as a black zone. In the fundus could be seen choroidal changes with sclerosis of the choroidal vessels, which were probably responsible for the atrophy of the ciliary processes.

CASE 5. *Seclusion and occlusion of pupil. Atrophy of iris.* Fig. 15. Miss N. G. 27 yrs. old had an attack of iridocyclitis five years ago in the left eye, with several recurrences later on. When examined a complete occlusion and seclusion of the pupil with slight iris bombé, was found. Tension was diminished, atrophy already beginning in the globe. Vision reduced to light perception. An

iridectomy was performed, but vision did not improve. The pupillary exudation (E. Fig. 15) covered a great part of the lens, the periphery L, being still transparent.

With the gonioscope the atrophy of the iris tissue is marked in places. Beyond the edge of the semitransparent lens a deeper white exudate D, lying in the vitreous, makes a striking contrast with the red fundus. Above, the dark line of the ora serrata clearly limits the region of the orbiculus ciliaris. Ciliary processes are enlarged and of a lighter color than normal. The base of two of them present small, yellowish gray spots of degeneration.

IRITIS.

In acute iritis the examination of the angle is often difficult due to the turbidity of the aqueous. When this begins to clear up, it is possible with a strong illumination to observe the deep structures.

Case 6. *Gonorrheal iritis.* Fig. 25 belongs to a man 20 years old suffering from subacute gonorrheal irits. The iris markings are hazy, and in the recess of the chamber the ciliary body is covered with a yellowish band of fibrinous exudation, whose outer border is very indistinct. The Schlemm zone is not separated from the white sclera.

Case 7. *Luetic iritis.* Fig. 16 shows the lower part of the angle in the right eye, and Fig. 17 the temporal side of the left eye of the same patient. Mr. H. R. 29 yrs. old gives a history of lues treated continually for two years, the Wassermann becoming negative 3 or 4 months before the examination. One week previously the right eye became inflamed and an attack of subacute iritis set in. To the gonioscope the cornea appeared slightly hazy, with characteristic deposits on Descemet's membrane. The iris in semidilation by the atropin was veiled, and the markings on the surface indistinct. At the root of the iris a large fresh hemorrhage, invisible to the lateral illumination, was plainly seen near the ciliary body. On account of the history and negative Wassermann the syphilitic nature of this iritis was doubtful.

The examination of the other eye, apparently healthy, was very instructive. (Fig. 17.) Near the root of the iris two yellowish-red elevations raised abruptly from the surface, having in the background the brown strip of the ciliary body. Upon the Schlemm zone numerous fine, yellowish-red, thread like exudates of coagulated fibrin revealed the inflammatory nature of this undetected peripheral iritis, with characteristic luetic papules. That these formations were not gummata was apparent when they entirely disappeared one week afterwards, by a strong mercurial treatment. These papules, furthermore, clearly pointed to the luetic nature of the iritis in the partner.

Case 8. Fig. 26. *Iritis after cataract operation. Atrophy of iris.* Girl 13 yrs. old operated for congenital cataract in another institution. A secondary membrane remains which is bound to the iris by several posterior synechia. The iris is stretched, the contraction furrows have disappeared, and near the ciliary border two white homogeneous atrophic patches and another showing the interlacing atrophic markings, are separated by a lump of pigment. In the recess of the chamber a yellowish band of exudate still covers the ciliary body, but the indistinct irregular margin shows it is not recent. The Schlemm zone, wider than normal, has a clear-cut border.

In some cases of iritis and iridocyclitis a peripheral synechia, either partial or total, can be found. Its early recognition is important to prevent the bad results of continued hypertension. A complete peripheral synechia at first temporary, may become permanent if the tension is not lowered. For that reason atropin must be discontinued and eserin, or better repeated paracentesis of the cornea, performed. Salzmann in 24 cases observed a complete adhesion of the iris to the sclera in 7 patients; in another 7 its presence was doubtful, and in 10 the angle was free.

GLAUCOMA.

The discovery of Knies and Weber of the adhesion of the root of the iris to the cornea in many cases of advanced glaucoma, opened an entirely new field for the physiopathology of this disease. The retention of the intraocular fluids due to the occlusion of the excretory channels

PLATE 12

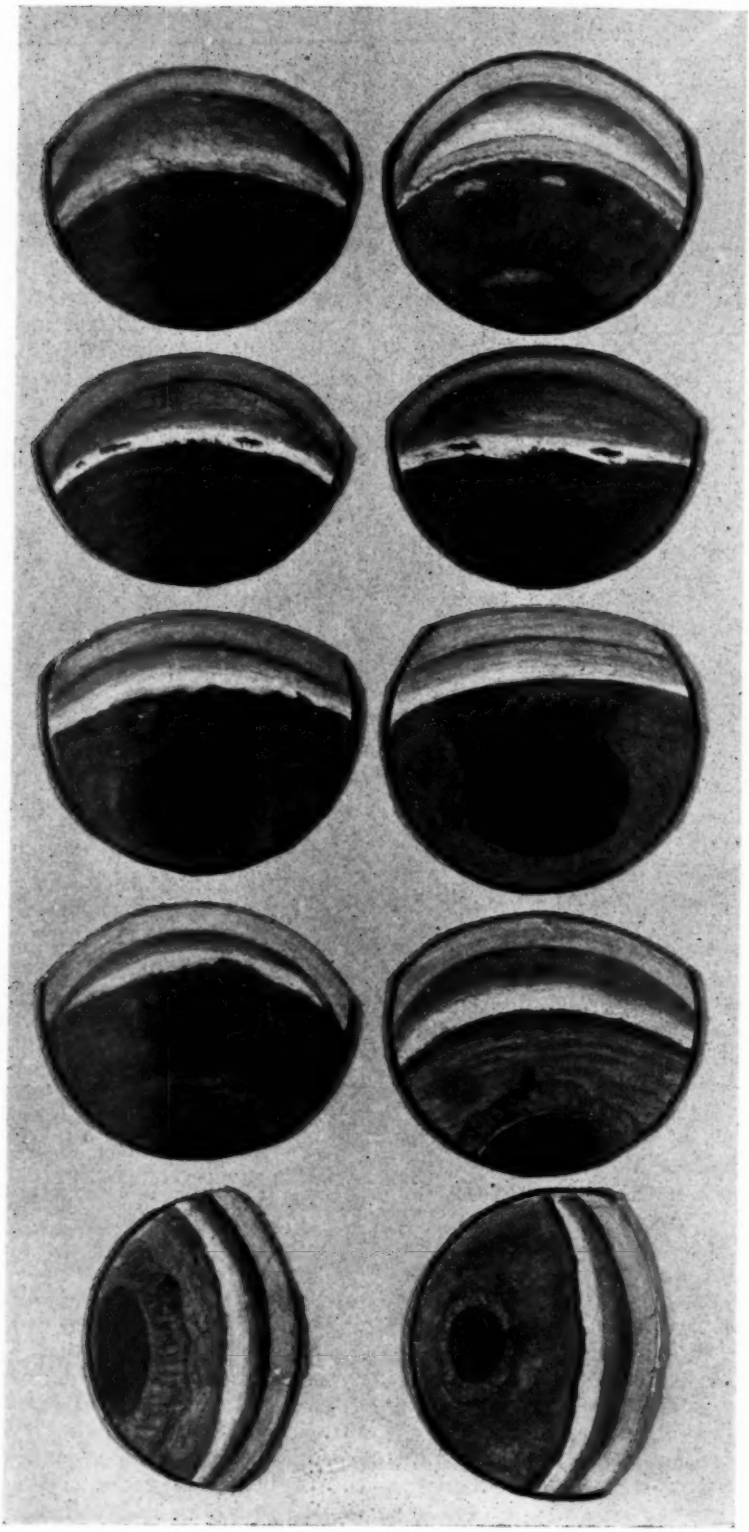

Fig. 25 Fig. 26

Fig. 27 Fig. 28

Fig. 29 Fig. 30

Fig. 31 Fig. 32

Fig. 33 Fig. 34

GONIOSCOPY, M. URIBE TRONCOSO.

ANGLE OF ANTERIOR CHAMBER IN DISEASE.

PLATE 12.

Fig. 25.—L.E. Upper angle. Iritis gonorrheica. Fibrinous exudate covering the ciliary body. The aqueous is turbid and lowers the visibility of the angle.

Fig. 26.—R.E. Upper nasal angle. Iritis after cataract operation. Secondary membrane in the pupil and posterior synechiae. Radial furrows of the iris. Two white atrophic patches, one of black pigment and another with threadbare iris tissue. Yellow exudation with clear cut margin above, covering the sinus of the chamber. Schlemm zone broader.

Figs. 27 and 28.—L.E. of the same patient as Fig. 20 before and after eserin treatment. Complete peripheral synechia. Iris processes. In fig. 27, the iris border is regular and straight. No ciliary body is visible. Very narrow scleral zone with two large streaks of black pigment. In fig. 28, the stretching of the iris has produced three folds, the valleys corresponding to the places of least resistance in the synechia.

Figs. 29 and 30.—The right and left eyes of the same patient after iridectomy. In the right (Fig. 29), the processes are atrophic, distorted and pushed against the sclera. The iris was very friable and a small rent can be seen in its root, at the right of the picture. Tension came down after the operation. In the left eye (Fig. 30) the processes are larger especially to the left, and close to each other. Yellow and black spots appear on their surface. Another row is seen behind the first, to the left of the picture. The tension remained high and a new subacute attack of glaucoma developed.

Fig. 31.—R.E. Upper angle. Simple glaucoma with congestive attacks. Trephining and partial iridectomy. Tension remained high. Iris discolored. Margins of the pupil and coloboma bound to the lens by exudates. Ciliary processes enlarged, crowded and pushed against the sclera. Hole of trephining not visible.

Fig. 32.—L.E. Upper angle. Simple glaucoma treated with myotics for many years. Angle entirely free. Ciliary body very apparent and wide. The Schlemm zone is not separated from the white sclera.

Fig. 33.—L.E. Temporal angle. Simple glaucoma. Anterior chamber very shallow. Lesser circle of the iris very high. Iris border is regular in outline and covers the ciliary body entirely.

Fig. 34.—Same eye and region of the angle after the use of eserin. Pupil very contracted with marked ectropion on the uveal layer. Lesser circle less prominent. The ciliary body is now uncovered all around the angle, showing there was not peripheral synechia, but only application of the root of the iris against the sclera.

---

of the eye, so completely explained the continued increase of tension, that it was immediately assumed that all cases of glaucoma were due to this cause.

However, this theory tottered in its foundations when in cases of acute and subacute glaucoma pathologic examinations proved the angle of the chamber to be entirely free. Some authors, nevertheless, still claim that a peripheral synechia exists in most cases of congestive glaucoma from the beginning, and that the blocking of the angle is the starting point of all symptoms of the disease. The histologic examinations of cases with prodromic or acute glaucoma being a rarity, because the specimens can be procured only when the patient dies of some other disease, the question has necessarily remained unsettled.

The new method of gonioscopy affords an easy means of examining the angle from the time the premonitory stages start. The material available being unlimited, the possibilities from the scientific and practical standpoint are undoubtedly very great. Almost all authors admit that hypertension is the most characteristic symptom of glaucoma, and the source from which all other changes in the structures of the eye arise. But what is the cause of the hypertension itself, if the mechanical theory of Knies is insufficient to account for the genesis of acute glaucoma? By gonioscopy Salzmann, Koeppe and myself have found cases of glaucoma without adhesion of the root of the iris. Cases of adhesion without glaucoma have also been recorded by several observers, including the author.

The condition of the absorbing surface of the iris is of great importance. The excretion of the aqueous takes place not only thru the angle, but also by way of the veins in the iris. A hyphema in the anterior chamber is absorbed even in absolute glaucoma with peripheral synechia. If this becomes permanent the vessels in the root of the iris degenerate and the circulation is sluggish. New vessels are sometimes formed in the iris root extending thru the sclera into the dilated episcleral network, in an effort to reestablish the return circulation.

Hence the importance of the early detection of peripheral synechia* and the recognition of its extent around the limbus, its breadth and its recent or permanent character. The tonometer gives a valuable method for the diagnosis of hypertension and glaucoma; the

*The term *peripheral synechia* should be used in preference to the more common adhesion of the root of the iris. It is shorter and conveys a better idea of the pathologic attachment of the periphery of the iris to the sclera.

gonioscope will complete our examination and furnish important signs for the prognosis and treatment.

Peripheral synechia can be recognized in the following way. The root of the iris being pushed forward by the edema of the vitreous and the swelling of the ciliary processes, the sinus or recess of the anterior chamber disappears; the root of the iris folding as a hinge upon the sclera allows the last thick fold or roll of the iris (Fig. 27) to come into apposition with the sclerocorneal trabeculum. The ciliary body is entirely concealed from view, and a new false angle is formed.

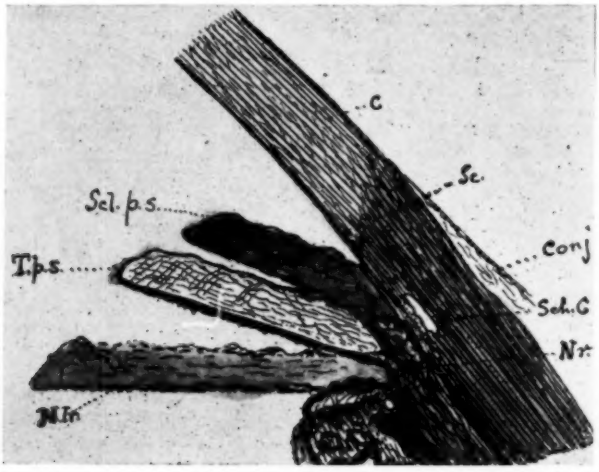

Fig. 35.—Semischematic representation of peripheral synecia. N. ir., Normal iris. Nr., Normal recess of the angle. Sch. C., Schlemm canal. Sc., sclera. C., cornea. T. p. s., Trabecular peripheral synechia; the root of the iris is drawn forward and applied against the sclera. Corneal trabeculum which is half covered. The ciliary processes are also drawn forward. Scl. p. s., Scleral peripheral synechia. The root of the iris is attached to the whole scleral zone; a new false angle is formed near the insertion of the cornea.

Peripheral synechia must be considered in its two dimensions, that is in length and width. The length depends upon the extent of the adhesion around the limbus. If this is limited to a part of the angle the others remaining free, a *partial peripheral synechia* is present, viz. a nasal, temporal, upper or lower synechia. (Fig. 19, 21, and 23.)

In case the adhesion is made only of a small bridge like portion of the iris it may be called a *restricted* peripheral synechia. (Fig. 20.)

When the whole periphery of the iris is attached to the sclera an *annular or total* peripheral synechia is present. (Figs. 18, 22, 28.)

According to the amount of back pressure the adhesion may be broad or narrow, that is the border of the iris will cover part or the whole inner surface of the sclera. When the ciliary body and a part of the Schlemm zone only are concealed, it may be called a *narrow or trabecular* peripheral synechia (Figs. 35 T.p.s. and 24). If the border of the iris encroaches upon the scleral zone, coming near or even to the insertion of the cornea, we speak of a *broad or scleral* peripheral synechia (Figs. 35 Scl. p.s. and 19, 22, 28). These names, in my opinion, are preferable to "complete and incomplete" synechia, proposed by Salzmann; which can be mistaken for the designations of length. Should the Schlemm zone be always visible as a gray band, the breadth of the synechia could be easily ascertained. Unfortunately, very frequently the sclera has a uniform white color from the ciliary body to the corneal margin, and it is only by the width of the scleral zone left that the breadth of the adhesion can be detected. However, it is necessary to bear in mind that the breadth of this zone may appear different according to the plane of the observer's vision. When this is tangent to the iris the white zone appears broader and when the instrument is raised it becomes narrower. The diagnosis, for that reason must be based:

1st, on the disappearance of the ciliary body; 2nd, on the covering of part or the whole of the Schlemm zone by the iris border, and 3d, on the narrowing of the scleral band.

The temporary or permanent character of the peripheral synechia can be ascertained by the use of a strong miotic. When the adhesion is recent or when a pseudosynechia is present, the stretching of the iris will liberate the angle recess making the ciliary body again visible, (Figs. 34 and 35) or may at least change the character of the synechia from the scleral to the trabecular type.

In hyperopia, or in old age, the anterior chamber is shallow and the ciliary border of the iris conceals the ciliary body. In these pseudosynechia it is necessary to instill some drops of eserin, and wait for the full contraction of the iris in order to make the diagnosis. (Figs. 10 and 11).

The shape of the border of the iris inserted in the sclera in total synechia has been emphasized by Salzmann, who describes it graphically as a range of mountains (Figs. 22, 24). However, in many cases this condition does not exist, the border of the iris being regular or slightly waved (Figs. 18, 28). A peculiar effect of the eserin on a complete synechia is shown in Fig. 29, where the border of the iris and part of the surface are thrown in three folds, the depressions corresponding probably to places in which the adhesions were weaker and gave way to the stretching, while the apex represents the permanent attachment.

I have been able to observe in some cases of peripheral synechia a yellowish or grayish red band bordering the insertion of the iris to the sclera, and dotted with numerous fine grains of dark pigment (Figs. 21, 27, 29).

What is the nature of this deposit? Is it yellow pigment from the ciliary body or a fibrinous exudate produced by the application of the root of the iris to the sclera, which becomes visible when by the action of eserin (Figs. 19, 20,) or by iridectomy (Fig. 23) the iris is drawn from its attachment? Probably both are present. The wavy outline of the scleral border of this band, and the fact that it does not cover the ciliary body, when this is laid bare (Figs. 21, 23), seems to indicate that it is made by the impression of the iris upon the sclera. Further observations are necessary to confirm this view.

Pigment in the form of large fine black dots (Figs. 22, 28,) or in streaks (Fig. 21) is found over the sclera. It has its origin according to Salzmann and Koeppe in the pigment epithelium of the iris. The grains of pigment are taken by the aqueous currents and deposited in the stroma of the iris or in the sinus of the chamber.

The surface of the iris frequently shows patches of atrophy, beautifully observed with the gonioscope. They are scattered upon the iris especially at the edge of the pupil and coloboma (Fig. 18,) or the whole surface looks discolored and threadbare. The gonioscope has been used generally after the tonometric examination with the patient lying down on his back, a much more comfortable position than the sitting posture required by the slit lamp.

Case 9. *Acute glaucoma.* Mrs. S. H., 52 years old, was admitted to the Post-Graduate Hospital with an acute attrack of glaucoma in L. E., preceded by intermittent obscuration of vision and halos of both eyes, for the past year. The lids of the left side were swollen, the eye very much injected, the cornea hazy, anterior chamber shallow and the pupil dilated. Vision, counts fingers at 2 feet. Tension with Schiotz 100 mm. A posterior sclerotomy was done, and eserin instilled. The gonioscope was used in an endeavor to ascertain if a peripheral synechia was already formed, but the findings were not conclusive on account of the great edema of the cornea. An iridectomy was performed four days afterward by Dr. J. W. Smith with complete success; the tension coming down immediately, and the vision improving to counting fingers at one foot.

A second gonioscopic examination two weeks afterwards detected a total peripheral synechia all around the limbus (Fig. 18) with very narrow scleral zone. The insertion of the iris is slightly jagged. On the surface of this membrane and in the superior edge of the coloboma, many patches of discolored

and atrophic stroma tissue were apparent.

Six weeks later the right eye became red and painful and the vision was greatly reduced. Unfortunately I could not examine the patient at this time. After using eserin for two days these symptoms subsided, and the tension lowered to 22.5 mm. Gonioscopy showed clearly in the temporal side of the angle a partial peripheral synechia, the ciliary body and the Schlemm zone being invisible, and the border of the iris wavy and irregular in outline; but on the nasal part (Fig. 19) the synechia had been detached in part and the ciliary body appeared as a brown band. The white scleral zone was of almost normal size. In view of the partial synechia in this eye which the eserin did not detach, an iridectomy was advised, but the patient refused to be operated.

It is a matter for speculation how the iridectomy worked in the right eye. Notwithstanding the total peripheral synechia, the eye drained its contents perfectly, if we may judge by the lowering of the tension which was reduced to, and remained around, 17 mm. The iridectomy was not broad, and in its base the extent of the Schlemm zone, which was restored to the filtration, small. The scar of the operation solid and nonfiltrating. The stroma of the iris was clearly atrophic and the veins probably degenerated and occluded by the adhesion of the root.

Case 10. *Chronic Congestive Glaucoma.* Mr. M. S., 34 years old, had been subjected for two and half years previously to periodic obscurations, diminution of sight and colored halos around the lights. Has been under treatment for syphilis for some years past, Wassermann being still positive. Is addicted to alcohol. When examined Feb. 5th, 1923, ciliary injection was marked on both eyes, corneas steamy, iris moderately dilated but still responsive to light and almost no pain. Deep excavation of the nerve on the right side, less marked in the left. T = 45 mm. in each eye. Vision reduced to counting fingers. Eserin was prescribed and a week afterwards both corneas had cleared; pupils were contracted, and vision restored to counting fingers at one foot, in right eye and to 0.8 in the left. The fields were contracted to 10 degrees around the fixation point in the right eye and about 15°, with an extension toward the temporal side of 50°, in the left eye.

With the gonioscope (Fig. 20) a partial restricted synechia was found in the temporal side of the angle of the right eye.

The ciliary body and Schlemm zone were covered all around the limbus with a yellowish pigmented stripe, wavy in its anterior border, and probably produced by the impression of the iris, as stated before. The restricted synechia was the result of the detachment of the peripheral adhesion by the eserin. The anterior border of the yellowish exudate represented the advanced line of insertion of the root of the iris to the sclera.

With the Salzmann contact glass and +20 in the electric ophthalmoscope, a few iris processes stand up very clearly in the edge of the iris. No part of the yellowish exudate or of the synechia could be seen. The white scleral zone was very reduced. In the left eye the gonioscope shows a total peripheral synechia, with the new angle of the chamber near the edge of the cornea (Fig. 27). The iris border is thick and irregular and has some iris processes. Pigment is present in black streaks upon the sclera. Fig. 29 shows the same upper region after prolonged eserin treatment. The peripheral synechia has not been broken. The iris pulling away from the sclera is thrown in three folds; the valleys corresponding to the places of least resistance.

After four months of miotic treatment I performed an iridectomy in the worse eye, the right, tearing down the root of the iris, thruout the wound. Vision improved to counting fingers at three feet and tension lowered to 24 mm., and later on to 17 mm. With the gonioscope, some weeks later, the ciliary processes are clearly visible in the coloboma (Fig. 30). They are atrophic, distorted, and pushed above and against the sclera, in the inner part. The stroma of the iris is friable as shown by the small rent in the root of the iris at the nasal side.

In the left eye the tension being lowered to 26 mm. the operation was delayed; but the central vision kept de-

creasing slowly, and the visual field narrowing on the temporal side. A broad iridectomy was performed January 7th, 1924, tearing out the root of the iris. The results were not as good as in the right eye. Vision did not improve. Tension remained high. Gonioscopy shows a broad coloboma in whose base the ciliary processes are very apparent (Fig. 31). In opposition to the other eye, these processes are of a large size, especially to the right of the picture, close to each other, and disposed in several rows. Some of them display yellow and black spots.

One month after the operation, as the result of exposure, this eye suffered a subacute attack of glaucoma, with severe pain, redness and diminution of vision to counting fingers at one foot. Tension rose to 52 mm., and only after prolonged eserin treatment came back to 31 mm.

Conditions of the other eye were very different. Tension was only 18 mm.; cornea and vitreous clear and vision at the same figure as before. Two months later, the tension remaining high (48 mm.), a trephining operation was done with immediate results. The filtering scar was very conspicuous and the eye became soft, but the vision did not improve. Posterior synechiae began to form and atropin had to be resorted to.

This case is very interesting on account of the striking difference of the action of iridectomy on the two eyes. Altho the operative technic was the same on both, in the left eye the ciliary processes became small and atrophic, and the eye quieted and even improved in sight. In the right eye altho the base of the coloboma was broad, with no root of the iris left, the ciliary processes remained congested and swollen, the tension was kept very high; a new acute attack coming suddenly and destroying vision.

CASE 11. *Simple glaucoma with congestive attacks.* A. B., a colored man, 66 years old, was seen thru the courtesy of Drs. Knapp and Schoenberg in the Knapp Memorial Hospital. In 1916, eight years before my examination, he had a primary luetic optic atrophy in both eyes; the left losing sight entirely, and the right being reduced to 20/40. Symptoms of increase of tension appeared in both eyes and in December, 1922, R. E. had T = 35 mm. and L. E. = 45 mm. After a prolonged course of miotics Dr. Schoenberg made a trephining in the right eye, with partial iridectomy; but the tension went up again and on the day of my examination was 65 mm. with loss of light perception.

Fig. 32 shows the condition of this eye with the gonioscope. The margins of the pupil and edges of the coloboma were bound to the lens by whitish exudates. The iris is discolored. In the broad coloboma the ciliary processes are very conspicuous, enlarged, crowded and those in the inner part pushed up against the sclera. The hole of the trephining is not visible, and there is probably an adhesion of these processes to the inner part of the sclera. All around the limbus the peripheral synechia is complete.

In the left eye vision had steadily decreased, until it was reduced to L. P. Deep papillary excavation. Under miotics the tension had been kept under control, and on the date of my examination it was 35 mm. Fig. 21 shows the lower and outer part of the angle. The ciliary body is visible in the inner part as a dark brown band, but in the outer the iris comes forward and is attached to the sclera with a characteristic wavy outline. A yellowish red zone similar to that seen in Fig. 20, and sprinkled with dark pigment grains, probably represents the impression of the primitive attachment of the root of the iris, which was covered by a layer of fibrin as shown by the outer jagged border of this band, which does not cover the ciliary body but lies upon the sclera alone. No Schlemm zone is visible. The scleral band is somewhat reduced.

The interesting features in this patient are the great swelling and distortion of the ciliary processes, in an eye in which trephining failed to reduce the tension; just as in the left eye of the former case (Fig. 31) the iridectomy failed to prevent a new attack of glaucoma.

CASE 12. *Simple glaucoma with congestive attacks.* Mrs. J. T. had been suffering from gradual diminution of vision for one year. She went to the Knapp Memorial Hospital, where a diagnosis of simple glaucoma was made. Symptoms of hypertension developing,

she was operated on by Dr. Schoenberg, first in the right and then in the left eye, by Elliot's trephining and partial iridectomy.

When I examined the patient a deep cupping with clear media was found in both eyes. In the R. E. numerous posterior synechiae bind the pupil and edge of the coloboma to the capsule. A total peripheral synechia can be detected all around the limbus (Fig. 22). The border of the iris is thickened and raised like a range of mountains (Salzmann), and in the valleys numerous fine grains of black pigment are deposited upon a yellowish-red indistinct band on the sclera. The white scleral zone is much reduced in breadth. The eye is blind, only L. P. remaining.

In the left eye, probably the pulling of the iris with the forceps during the operation and the prolonged course of miotics afterwards, broke off the adhesion in the upper part of the limbus, where the ciliary body became again visible, as a dark brown stripe (Fig. 23). Below, the adhesion receded, leaving a yellowish red zone, dotted with fine grains of pigment, in which the ciliary body was not visible; the peripheral synechia being permanent. The pupil is free from synechiae, and vision reduced to counting fingers at two feet.

CASE 13. *Simple glaucoma in one eye, and initial glaucoma in the other.* Mr. J. V., 43 years old, began to notice a failing of vision in the right eye two years ago, without pain or redness. The sight becoming worse, he was operated, in another hospital, two months ago. On examination, I found a deep cupping of the disc and tension = 60 mm. Counts fingers at one foot.

With the gonioscope a hole corresponding to the trephining, can be seen in the inner part of the sclera; its color being of a bluish shade and darker than the surrounding tissues. The coloboma is free from adhesions. A total peripheral synechia is present around the limbus.

The other eye has almost normal vision. There is no cupping. However, tension is 30 mm. and with the gonioscope a trabecular peripheral synechia is apparent (Fig. 30). The border of the iris is wavy, and in the valleys the Schlemm zone is still visible as a pinkish stripe. The ciliary body is concealed. That this pinkish band is not a receding synechia is proved by its perfectly drawn edge, and also by the lack of grains of pigment, so common in the former.

CASE 14. *Simple glaucoma with free angle.* Mr. E. M., 50 years old. Has been under treatment with miotics for many years. No operation performed. Both eyes have a deep excavation of the disc, with incipient equatorial cataract in the right eye. Tension in this eye is 24 mm. and vision reduced to hand movements.

In the left eye T=27 mm. V= 20/200. The gonioscope shows that the angle of the chamber is entirely free (Fig. 33). The ciliary body is perfectly visible and wide. The Schlemm zone is not colored. Sclera of normal breadth.

CASE 15. *Simple glaucoma with free angle.* An interesting observation of a case of simple glaucoma without peripheral synechia, in which the patient was seen for a long time, is the following: Mrs. A. S. complained of cloudy vision, especially in the right eye, since May, 1923. She had colored halos and headaches, but never a severe pain. Examination showed Right eye, V=20/30; T=30 mm. In the fundus, a deep excavation of the disc, and an old patch of choroiditis above and outside of the papilla. The field of vision was very restricted in the nasal part and above, being near the fixation point. In the temporal part extended to about 70°.

In the left eye, V=20/25; T=35 mm. Cupping limited to the temporal part of the disc, where the vessels make a sharp bend, while the nasal part has still a ring of normal tissue. Field restricted to 50° outward and 30° inward. With the gonioscope both eyes show a very shallow anterior chamber, the lesser circle of the iris rising high above the lens (Fig. 33, left eye). The ciliary border of the iris is regular in outline. No ciliary body or Schlemm zone are visible.

After using a strong dose of eserin for some days in the left eye the gonioscope is again applied. In (Fig. 34) the pupil is very contracted, and a broad rim of ectropion of the uveal layer stands out

on the colored surface of the pupillary zone. The iris is stretched and the lesser circle less prominent. The ciliary border is distinct and wavy. The ciliary body lies uncovered thru the whole extent of the angle as a wide brown stripe. The Schlemm zone has the same color as the sclera.

The reappearance of the ciliary body after the use of eserin all around the limbus, proves conclusively that no adhesion of the root of the iris had taken place, the latter being only pushed by the increased volume of the vitreous.

Miotics were continued faithfully by the patient for two months, but the tension raising to 45 mm. and the field of vision contracting more and more, a trephining operation was made in the right eye with immediate decrease of tension, but no improvement in vision.

A new gonioscopic examination in the left eye made recently showed the angle still free all around.

Besides the above mentioned cases, the gonioscope has been used in many other where changes have been produced in the structures of the angle. It gives valuable data in injuries, especially iridodialysis and inversion of the iris. In a case of congenital irideremia the gonioscope was of use for determining the total absence of this membrane and the condition of the ciliary processes. In buphthalmus the detection of peripheral synechia is of importance for selecting the proper operation.

The examination of the angle in leucoma adherens with anterior synechia, shows the place and extent of the peripheral adhesion. Tumors of the ciliary body, gummata and tubercles can be detected in an early period of its development.

BIBLIOGRAPHY.

1. Trantas. Ophtalmoscopie de la region ciliaire et retrociliaire (Appendice) *Archives d'Ophtalmologie,* September-October, 1907. Ibid. *Archives d'Ophtalmologie,* September, 1918.
2. Salzmann, M. Die Ophthalmoskopie der Kammerbucht. *Zeitschrift für Augenheilkunde,* 1914, vol. XXXI, p. 1.
3. Ibid. Die Ophthalmoskopie der Kammerbucht. II. *Zeitschrift für Augenh.,* 1915, vol. XXXIV, p. 26.
4. Ibid. Die traumatische Cyclodialyse und ihre Diagnose am Lebenden. *V. Graefe's Archiv für Ophthalmologie,* 1921.
5. Ibid. Ueber sie Sichtbarkeit der Ora serrata, die Ablösung dieser Gegend und die traumatische Myopie. *Report of the Vienna Ophthalmologic Society,* 1921.
6. Koeppe, L. Die Theorie und Anwendung der Stereomikroskopie des lebenden menschlichen Kammerwinkels im fokalen Lichte der Gullstrandschen Nernst-Spaltlampe. *München. mediz. Wochenschrift.* Nrs. 26-27, June, 1919, p. 708.
7. Ibid. Die Mikroskopie des lebenden Kammerwinkels in fokalen Lichte der Gullstrandschen Nernstspaltlampe. *Von Graefes Archiv für Ophthalmologie,* 1919, and in his book Die Mikroskopie des Lebenden Auges, vol. I, Berlin, 1920.
8. Ibid. Das Stereo-mikroskopische Bild des lebenden Kammerwinkels an der Nernstspaltlampe bei Glaukom, German Oph. Society, 1920. *Klinische Monatsblatter für Augenheil,* 1920, vol. LXV, August-September, p. 389.
9. Uribe Troncoso, M. The Physiologic Nature of the Schlemm Canal. *American Journal of Ophthal.,* May, 1921.
10. Ibid. Gonioscopy With the Electric Ophthalmoscope. New York Academy of Medicine, 1921.

EOSINOPHILIA AND ETIOLOGY OF PARINAUD'S CONJUNCTIVITIS.

SANFORD R. GIFFORD, M. D.

OMAHA, NEBRASKA.

This case adds one to those recorded in which marked eosinophilia was present and also to those in which no causative microorganism was found. Cases classed under this heading are divided into four groups which appear as to etiology. Studied in the Department of Ophthalmology, University of Nebraska Medical College.

Since Weaver and Gillette's report on a case of Parinaud's conjunctivitis showing eosinophilia, I have observed one typical case in which a differential blood count, prompted by their paper, showed a similar finding. It seems worth while to report it, as it may encourage other observers to make this examination in their cases and so to determine whether such a sign is frequently found and of any diagnostic value.

Irene M., aged 11, appeared complaining that the left eye had been inflamed for two weeks. The lids had been swollen and two days ago she noticed swelling of the glands in front of the neck. Examination showed normal vision in both eyes with many large follicles in the lower folds. Both left lids are much swollen. The conjunctiva is much congested. In the upper fold is a large granulation with a yellow point of necrosis at the tip and several other large follicles. (See Fig. 1.) Several follicles also show these points of necrosis. The preauricular gland is large and tender and the cervical glands much enlarged and very tender. Two days later the condition was about the same. A week later the glands were still enlarged and the patient complained of fever and symptoms of general intoxication. The only treatment was the use of 1% mercurochrome as a collyrium and hot applications. Two weeks after her first visit the swelling of both lids and of the glands was still very severe, temperature was 99.5 and the general symptoms of malaise and fever were marked. The patient did not return for further observation. Blood count at this time showed:

White cells 15,200, polys 54.5%, large mononuclears 18.5%, small mononuclears 21.5%, transitional 2.5%, eosinophils 3.5%, basophils 0.5%. Smears from the secretion showed no organisms. Cultures from the secretion and from macerated granulation, excised from the upper fold, showed only staphylococcus aureus, probably a secondary invader. A guinea pig injected subconjunctivally and intraperitoneally with an emulsion of the excised granulation showed no symptoms. Sections stained for leptothrix, by Verhoeff's method, did not show anything suggesting leptothrix filaments or any other organisms. The histologic picture was of a fairly severe mononuclear infiltration, with many epithelioid cells and a few giant cells.

In Weaver and Gillette's case, the white count was 8,000, with 5 to 7½% eosinophils. The eosinophils subsided with the disease. In the present case the eosinophilia was not so marked, but still enough above normal to constitute a distinct abnormality. In Rolandi's case the white count was 11,000, with 8.5% eosinophils. His case, however, while clinically Parinaud's, gave a strain of tubercle bacillus on culture, and he considered it tuberculosis of the conjunctiva. He believes the picture of Parinaud's conjunctivitis is not a distinct morbid entity, but a syndrome which may be caused by different organisms.

Evidence in favor of this opinion, which has been voiced in French by Morax and Beauvieux, in German by von Herrenschwand, and in English by Pascheff[3] and H. Gifford[4] seems to be accumulating.

So far, with regard to the etiologic agent, at least four groups of cases have been reported.

1. Those due to B. tuberculosis, in which the organism was isolated from the lesions, or where inoculated guinea

pigs developed tuberculosis. (Rolandi, Darier, Wessely).

2. Those in which leptothrix filaments have been found in sections. Besides Verhoeff's 18 cases, which all showed it, only Keiper has reported positive findings.[5] Thru Dr. Verhoeff's courtesy, I have been able to examine his sections, and to show one mouse inoculated with it, and they considered it as probably identical with Verhoeff's organism altho it was gram negative. Cultures succeeded only under very special conditions and could not be transplanted, so that attempts at culture from other cases made in the usual way can easily be understood to have been negative.

Fig. 1.—Case of Parinaud's conjunctivitis showing swelling and large follicles of left lids.

at an American Academy meeting. There is no doubt that a filamentous organism was present in his cases in the pathologic areas, but cultures and animal inoculations were not successful in isolating it.

The only case of Parinaud's conjunctivitis, so far as I know, from which a filamentous organism was cultivated is that of Wherry and Ray[6]. In cultures of pus aspirated from the preauricular gland and grown at partial tension, they found an organism showing as polymorphous, gram negative rods and delicate filaments. The same organism was found in multiple abscesses in a (For other occurrences of leptothrix see an article in the American Journal of Ophthalmology, 1921, Vol. 4).

3. A group of cases in which a very virulent gram negative bacillus was found. This organism, found by Pascheff in four cases, and called by him microbacillus polymorphous necroticans, is similar in most properties to the one found by von Herrenschwand[7], Bayer[8], and Rosenstein[9], which they identified as B. pseudotuberculosis rodentium. The accidental inoculation of Bayer's own conjunctiva, from the viscera of an infected guinea pig, afforded the only human case to be re-

corded which has been produced in the laboratory. Pascheff believes these cases form a separate disease, as no granulations were present in his cases, and the organism was so virulent that if present in other typical cases, it would surely have given positive animal inoculations. Possibly the cases of conjunctivitis tularensis described by Vail, Sattler, and Lamb form a group allied to this since the organisms which caused them, Bacillus tularensis, is in many respects similar to Pascheff's organism.

4. Cases with negative bacteriologic findings. This includes the greater number of cases and should include those where ordinary saprophytes only were found. In many of these, a complete bacteriologic investigation and animal inoculations were not made. In many others, however, these were carried out, and had B. tuberculosis, or the virulent bacilli of group 3, been present they should have been detected. I have made aerobic and anaerobic cultures in three typical cases, and have made animal inoculations from excised material and aspirated pus, all with negative results.

The case is different as regards Verhoeff's leptothrix, since its detection demands a very special technic. I have stained sections according to his technic in these three cases, and sent material to Dr. Verhoeff for examination, but no organism was found. Connell[10] and others have also followed his directions, with negative results. Thus there seems to be a definite group of cases including Parinaud's cases, which are not due to any of the organisms described, and whose cause remains to be discovered. To make use of the last resort of the unsuccessful bacteriologist, it may be said that it is possibly a filterable virus.

Brandeis Bldg.

BIBLIOGRAPHY.

1. Weaver and Gillette. A. J. O., 1923, vol. VI, p. 36.
2. Rolandi. Ann. di. Ott., 1916, vol. XLIV, p. 33.
3. Pascheff. Arch. d'Opht., 1921, vol. XXXVIII, pp. 23 and 83.
4. Gifford, H. B. J. O., 1924, vol. VIII, p. 350.
5. Keiper. Ann. of Ophth., 1913, vol. XXII, p. 780.
6. Wherry and Ray. J. Inf. Dis., 1918, vol. XXII, p. 554.
7. Von Herrenschwand. Ophth. Gesell. Heidelberg, 1918, p. 355.
8. Bayer and von Herrenschwand. Arch. f. Oph., 1919, vol. XCVIII, p. 342.
9. Rosenstein. K. M. F. A., 1922, vol. LXIX, p. 71.
10. Connell. Ophth. Rec., 1916, vol. XXV, p. 516.

AN APPARATUS FOR THE QUICK AND ACCURATE LOCATION OF THE MERIDIANS OF ASTIGMATISM.

C. E. FERREE AND GERTRUDE RAND.

BRYN MAWR COLLEGE, PA.

The apparatus here described is based on the formation of focal lines on the retina of an eye having regular astigmatism, the direction of which corresponds to those of the principal meridians. The images formed in such an eye are made more striking by having several points of light produced by minute holes in a plate that can be revolved in front of the light source.

Several years ago the writers devised a test for astigmatism in which the illumination scale was used in connection with the broken circle to detect the difference in resolving power in the astigmatic meridian and the meridian at right angles to it. The appliances needed for this test constituted a part of the acuity lantern described at that time. The test was intended primarily as a refinement on the less sensitive methods used in general practice and is especially valuable for determining the exact amount and meridian of the defect for low astigmatisms, and the exact amount for high astigmatisms. For these purposes the test, because of its great sensitivity, is extremely valuable —indispensable, we have found, for exact work, particularly in case of low astigmatisms. The present apparatus was designed as a means of making a quick preliminary determination of the meridian of the astigmatism. It can also be used quite satisfactorily for determining the amount of the astigmatism. It is simple in construction and remarkably easy to operate, both from the standpoint of the physician and the patient.

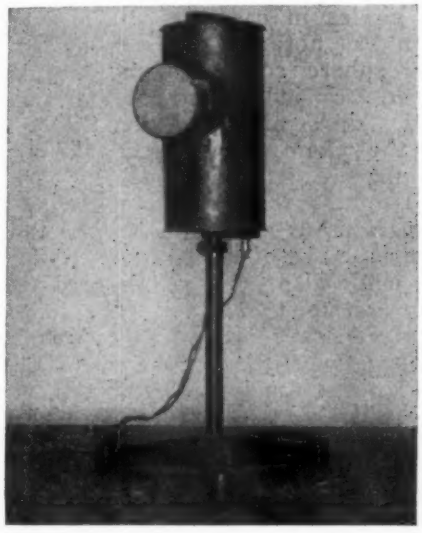

Fig. 1.—Apparatus for accurate location of meridians of astigmatism. (Ferree and Rand.)

This apparatus is referred to above as a preliminary means of determining the meridian of an astigmatism only in comparison with the very exact method described in the former article. It is fully as sensitive for that purpose as better methods in common use, and has the advantage of unusual speed and ease in making the determination.

For a description of the acuity lantern and the method of testing astigmatism with the illumination scale, the reader is referred to the following articles: Lantern and Apparatus for Testing the Light Sense and for Determining Acuity at Low Illuminations, Amer. Jour. Ophth., 1920, vol. III, p. 335; Visual Acuity at Low Illumination and the Use of the Illumination Scale for the Detection of Small Errors in Refraction, A. J. O., 1920, vol. III, p. 409; Sensitivity of the Illumination Scale for Determining the Exact Amount and Placement of Correction for Astigmatism, A. J. O., 1921, vol. IV, p. 22; Some Contributions to the Science and Practice of Ophthalmology, Transactions of an International Congress of Ophthalmology, held at Washington, D. C., April 25-28, 1922. 36 pages.

A photograph of the apparatus is shown in Fig. 1 and drawings illustrating the test plate in Fig. 2. The apparatus consists of a cylindrical, metal lamp house, mounted on a tripod stand. Inside of the lamp house is a frosted tubular lamp to furnish the illumination of the test plate. Extending out from the lamp house is a short projection tube 9 cm. in diameter, on the end of which is fastened the test plate in a rotatable mount. The test plate is made of thin, hard sheet aluminum. Along one diameter of the test plate is a row of three small holes 17 mm. apart. One of these is at the exact center of the plate. Illuminated by the lamp inside of the housing, these holes present three bright points of light in exact alignment with each other[2]. Also in exact alignment with these three points is a pointer which is bent at right angles over the ring in which the test plate is mounted. This pointer travels over a scale graduated to correspond to the scale of the

trial frames. The holes should be drilled with great care to prevent unevenness or raggedness of edge, i. e., they should be made to give as perfect a representation of points or dots as it is possible.

When viewed by an astigmatic eye the points tend to be drawn out into a line, the length of which depends upon the amount of the astigmatism. When the meridian of the astigmatism is at right angles to the line in which the points lie, each short line formed by the elongation of one of the points will form a right angle with that line, as is shown in Fig. 2, B. If the meridian of the astigmatism is at 45 degrees with that line, the fact will be indicated by the position of the short lines which always lie in the meridian of the astigmatism or parallel to it; and when the meridian of the astigmatism coincides with the line containing the three points and the pointer which travels over the graduated scale, the three short lines, the points and the pointer will always lie in the same line, Fig. 2, A. In order to aid the patient in identifying the line formed by the three points, it is continued to the edge of the test plate and to the pointer by a black arrow drawn on the plate, as is shown in Fig. 2. In case the test plate is black, which is perhaps preferable in order to make the elongations more distinct, this arrow should be made white. To locate the meridian of the astigmatism then the physician, under the direction of the patient, rotates the test plate until the alignment just mentioned is obtained.

One of the advantages of the test is that the exact location of the meridian of the astigmatism is indicated to the patient with his first glance at the test plate. That is, the short line formed by the elongation of the middle point lies in this meridian and the others run parallel to it. Because of this definite indication of the location of the astigmatism to the patient, the test requires a remarkably short interval of time, i. e., just long enough for the physician, under the direction of the patient, to produce the rotation required to give the desired alignment and to read the scale. The diagnosis of the amount of the astigmatism consists, of course, in finding the cylinder which reduces the lines to points, or to circles in case the sphere correction has not already been made. If the sphere correction has not been made, an indication of the amount and kind of correction is given by the sphere which reduces the circles to sharply defined points.

The test should be made with the apparatus at a distance of six meters from the eye of the patient. It should be made also in a well lighted room. On first thought it might be supposed that a dark room would be required. This, however, is not the case. In the dark room too much irradiation of an irregular character takes place to give the test its maximum precision and sensitivity.

Added sensitivity can be given to the test by using two or three parallel lines of points instead of one. If two lines are used they should be equally spaced on either side of the diameter of the test plate; if three are used, the middle line should coincide with the diameter and the others be equally spaced on either side. The advantage of more than one line of points is that the elongations are more easily detected when they extend from two points towards each other than when they extend out from one point alone. This applies to all of the positions of the plate with the exception of the one in which the final alignment has been made, and is

[2] The distortion of a point of light, a small disc, or circle of light, or other geometric figure as a principle for the location of the meridian of an astigmatism is, of course, not new. It has been utilized, for example, in the ametrometer described by Thomson (Transactions of the American Ophthalmological Society, 1878, p. 457; by Rée in work done in the laboratory of the Sorbonne (Undersoegelse af Ceiet med et lysende Punct, Copenhagen, 1896); in the astigmometer described by Hotz (Journal of the A. M. A., Sept., 1890, p. 425); and by Dodge (Apparatus for Testing Eyes, Specification of Letters Patent, No. 886,772, May, 1908).

The present apparatus has been designed as a very simple and inexpensive embodiment of the principle. The authors felt the need of an instrument which, after the sphere correction had been made, could be used just as quickly for the location of the meridian of the total astigmatism as the ophthalmometer for the location of the meridian of the corneal astigmatism. The advantage in speed in the use of this apparatus is due to the fact that the observer sees with greater exactness at first glance at the test plate the location of the meridian of the defect than is the case for astigmatism charts of the radial line type, for example.

The apparatus can be used to the best advantage if the sphere correction is carried as far as possible before testing for the astigmatism.

of service particularly in the detection of low degrees of astigmatism. Other features which might serve a useful purpose could also be added to the test plate. For example, three or four short lines parallel to the line or lines of points might be placed on one side of the points and the same number at right anges on the other side as shown at E and F in Fig. 2. Thus when the pointer is rotated into the meridian of the astigmatism the set of lines parallel to the line formed by the points will be seen as sharply defined and the other set as blurred. When the proper correcting cylinder is used both sets of lines will be seen as equally clear. This feature might give added sensitivity and certainty in determining the strength of cylinder that is needed to correct the defect; it provides also another check on the location of the meridian. As we have already stated, however, the chief point of superiority of the test is not in the determination of the amount of the astigmatism but in the quick and accurate location of its meridian. This superiority is due

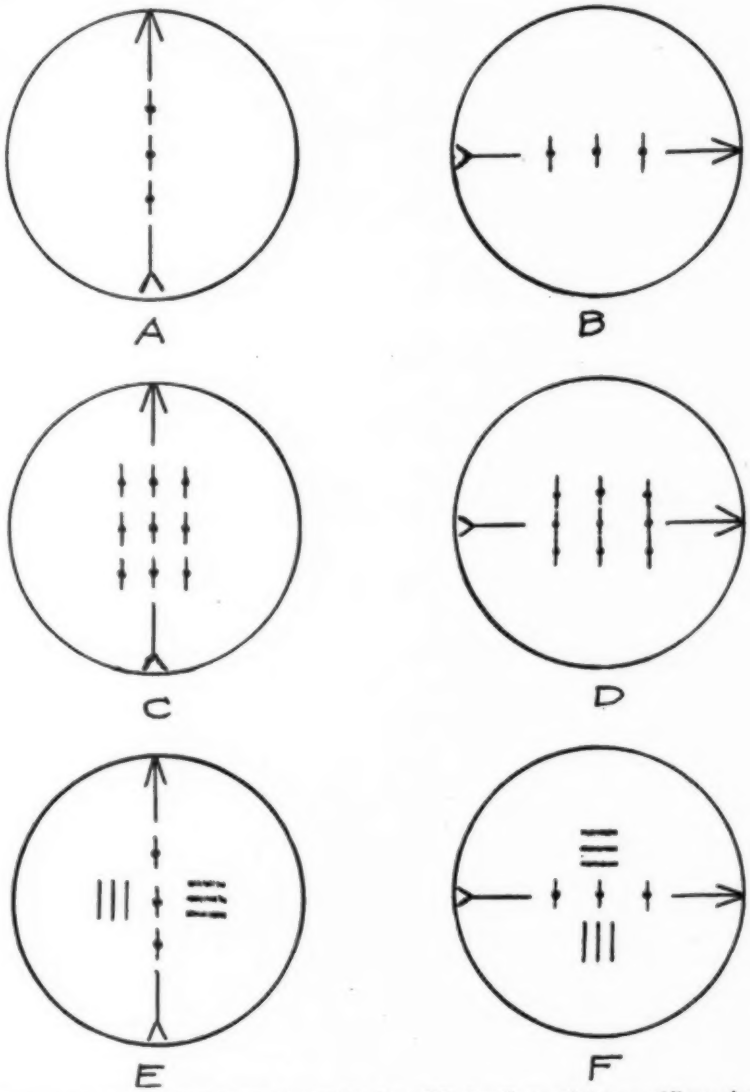

Fig. 2.—Diagrams of different test plates illustrating how diffusion lines point to meridians of astigmatism.

to the fact that the patient sees with the first glance at the test plate three short lines, one coinciding with the meridian of his defect the others parallel to it. The remainder of the task required of him is extremely easy, namely to judge as the physician rotates the test plate when these three lines form a part of the line determined by the three points, the arrow and the pointer. The judgment of alignment presents, perhaps, the least difficulty and has the highest precision of any that the eye is called upon to make. It has all of the ease and reliability of the reading of a scale by means of a pointer, a cross hair or other device which requires the judgment of the coincidence of two lines. Its advantage over having to judge at what position a line is clearest as it is being rotated from position to position, as is required in the closest approximation to this form of test, is obvious. (a) The former judgment is of impressions given simultaneously; the latter of impressions coming in succession. And (b) the former judgment is of space coincidence; the latter of difference in sharpness or clearness of seeing. The former judgment is of the type to which all working in the physical sciences try to reduce the reading of their instruments. Its high precision and reliability has long been recognized.

The instrument described has been used with a great deal of success and satisfaction in our laboratory for more than three years.

Bryn Mawr College.

TRAUMATIC DISLOCATION OF LENS INTO THE ANTERIOR CHAMBER.

VASILJ DERKAC, M. D.

ZAGREB, JUGOSLAVIA.

This is the report of a case, in which the eye had been injured six years before and now presented the dislocated lens in the anterior chamber, with advanced degenerative changes in the iris. The eye had escaped absolute glaucoma and regained some vision by removal of the lens. Similar cases are cited from the literature. Reported from the Eye Clinic of Professor A. Botteri, of the University of Zagreb, Jugoslavia.

A peasant, aged 37, was admitted to the Eye Clinic of the University, Zagreb, December 11, 1923.

Previous history was not significant. A piece of wood flew into her right eye 6 years ago, while chopping wood. The eye was bloodshot, red, congested for one week. The sight was supposed to have remained undisturbed, but in the last three months vision became blurred and remarkably decreased, and she sees nearly nothing with her right eye. Since then something white is visible in the eye. She is poorly nourished, but aside from the ocular condition apparently in good health.

Right eye. Moderate ptosis, wart on the lower lid border. Tarsal conjunctiva shows ordinary changes of chronic catarrh; the ocular conjunctiva and ciliary zone show slight congestion. The bulbar conjunctiva is pushed in three wedge shaped areas onto the cornea. These are three real pterygia. The corneal border is very indistinct, irregularly. The entire cornea is dull roughened, whitish, in its deeper layers clouded.

We perceive many superficial and also deeper vessels in the cornea. The anterior chamber consists of a peripheric zone only 2 mm. wide; and it contains a body easily recognized as the crystalline lens. The latter is diffusely whitish-green, hazy, more so in its center. The lens capsule appears dotted and clouded in its center, its peripheral haziness forms a ribbon 2 mm. wide, extending from 4 to 11 o'clock. The peripheral as well as the central clouds, are yellowish-white. The lens adheres to the posterior corneal surface. The iris is very narrow, in maximal mydriasis, hardly visible on account of the diffusely clouded cornea, atrophic, bluish-gray, apparently grown to the posterior lens surface. We observed several vessels on

the iris surface passing over the surface of the lens and uniting. Using an ophthalmoscope we do not perceive any reflex of the fundus.

Vision: Light perception, projection of the light on the temporal side only. Eye tension increased = 29 mm. Hg. Schiötz.

Left eye free of pathologic changes.

On January 2, 1924, a flap extraction of the cataract was performed, with corneal suture after Kalt. It was unavoidable injuring the lens while making the corneal incision. Insignificant

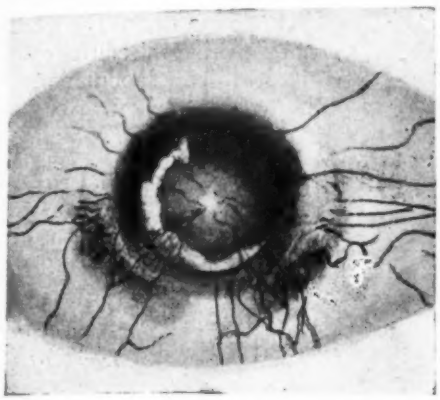

Fig. 1. — Crystalline lens dislocated into anterior chamber, cataractous and partly calcified.

loss of vitreous occurred, and the lens was dislocated into the vitreous. The lens itself was delivered by means of Weber's scoop, and its capsule by the iris forceps, and a suture was used. Intragluteal milk injection (7 c.cm.). On January the 8th, the suture was removed. The pupil was of medium width; but January the 18th, maximal mydriasis returned and did not yield to treatment of subconjunctival pilocarpin injections. Just at this time a violent coughing spell loosened the lips of the corneal wound, causing an insignificant prolapse of the iris. Tension increased to +1. Astigmatism of 12 diopters 35°, fundus not visible. Vision, hand movements at 3 m. Otherwise status as at admission. Dismissed on January 28th, at her own request.

Summarizing; we find dislocation of the lens into the anterior chamber of the right eye, which had suffered from a trauma 6 years ago. The luxation was supposed to have existed for the last three months only, and this was borne out by the patient, who complained of no pains; but merely asked to have the white body removed. The dislocated lens became cataractous, its capsule calcified. The iris as well as the cornea were scarcely injured. Vision had decreased to light perception. After operative removal of the lens, the healing process was satisfactory, and the vision improved to counting of fingers at 3 meters.

Traumatic dislocations of the lens into the anterior chamber are relatively rare. According to Foerster, dislocations of that sort occur in consequence of sudden increased eye tension, caused by heavy strokes on the corneal center. The extraordinary pressure is transmitted to the aqueous humor, dilating the pupil greatly; the iris margin being retracted over the lens equator and reaching behind the lens holds it tight.

The appearance is very peculiar in transparent lenses of young people; it appears as if there were a large oil drop in the anterior chamber. Dislocation occurs either right after trauma, or later. Of course the dislocated lens becomes hazy, because of exceptional nutritive conditions. There is an increased intraocular pressure on account of blocking of the drainage canals. Stoewer suggests that mechanical irritation of the iris may cause vasomotor disturbance, thereby influencing the secretion of the ciliary processes. Secretion is somewhat checked, resulting in relative lessening of the intraocular pressure. That would be an explanation of the well borne fixation, for a certain length of time, in our own case.

Ask ascribes a chemical influence to the dislocated lens, as a proper way of explaining inflammation of the retina and choroid.

As a rule the dislocation of the lens into the anterior chamber, because of acute glaucomatous onset, is badly borne by the patient. But there are cases observed in literature, of patients

who have stood this condition for 30 years.

In timid patients, the lens is regularly removed. Altho the lens is removed and the glaucomatous condition disappears, the results concerning the sight remain insignificant, due to the great injury of the retina. In Stoewer's case, the vision improved after lens extraction to only 4/7.5 with aphakic lens.

If the dislocated lens remains for some time in the anterior chamber it degenerates, becomes calcified (Hirschberg, Wagenmann) and injures the cornea considerably. At the places of pressure, the endothelial layer becomes destroyed and the aqueous humor enters the corneal parenchyma, causing degeneration of the latter. Ask points out that the lens grows to the neighboring tissues and this partly occurred in our own case. The ordinary end result is swelling and degeneration of the cornea, staphyloma, iridocyclitis and sympathetic ophthalmia.

Entire resorption (David Lindner), or even reposition of the disclocated lens, are considered as rare. Hoering succeeded in replacing the dislocated lens by dilating the pupil, and held it in normal position by pilocarpin. There were observed three genuine pterygia, in the above case on the right eye, while the left eye showed no like changes. We may assume the corneal degeneration, the primary cause of the pterygial formation.

Concerning the treatment of lens dislocation into the anterior chamber, there is in every case indication for immediate extraction of the lens. Wagenmann recommends flap incision downwards, narcosis and sitting position for the patient, to render removal of the lens easy. This operative modification may be right in acute cases where there is a high intraocular pressure and violent pain. In our case, we succeeded with the ordinary way of extraction, followed by the corneal suture after Kalt. The latter modification is of very great advantage in such a case. The healing went on satisfactorily but for the unimportant iris prolapse caused by the patient herself. The patient leaving the Clinic prevented treatment of the prolapse.

REFERENCES.

1. Ask, Zur Behandlung der Linsenluxationen, Klin. Monatsbl. f. A., 1915, p. 331.
2. Cantonnet, Luxations rares du Cryst. Arch. d'O., 1920.
3. Dor, Encyclopedia francaise d'O., VII, 77.
4. Hess, Graefe-Saemisch Textbook of O., Pathology and Therapy of the Lens, p. 291.
5. Hoering, Klin. Monatsbl. f. A., 1869.
6. Stoewer, Zur Prognose und Therapie der traumat. Linsenluxationen, Zeitschrift f. A., V, 1901, p. 181.
7. Wagenmann, Graefe-Saemisch Textbook of O., Injuries of the Eye, L, p. 511.

TREATMENT OF EXOPHTHALMIC GOITER.

L. D. Brose, M. D.,

EVANSVILLE, IND.

This paper reports a case in which there was angioneurotic edema of the conjunctiva, with the usual signs of exophthalmic goiter. Applications of Roentgen ray, to the thyroid gland, were followed by relief of all symptoms. A general review of the disease and its treatment is given.

Persons afflicted with exophthalmic goiter are more prone to consult the oculist rather than the internist because of the early eye manifestations. Our textbooks on diseases of the eye do not treat the subject as thoroly as the nature of this ailment demands. Because of multiplied specialism, the oculist is fully as competent as the internist in supervising the treatment to be given and judging as to the progress of the patient.

Our textbooks on ophthalmology, after an incomplete description of exophthalmic goiter, dismiss the subject with the statement that it belongs to internal medicine: this—notwithstanding that ophthalmology is a section of clinical medicine and that the early symptoms in this disease lead the patient to consult the oculist rather than the internist. As an example, I will recite the following case:

Mrs. W. E. S., married and thirty-six years of age, consulted me November 25th, 1923, for an acute angioneurotic edema involving the conjunctiva of the left eye. The disease yielded to cold compresses, a collyrium of zinc and the internal use of chloride of calcium.

On December 17th she again consulted me because of increased lacrimation for which no cause was found save an increasing nervousness. Her visual record was R. 15/xx; L. 15/xxx improved — R. plus 0.25 cyl. ax. 60°= 15/xv. L. plus 0.50 cyl. ax. 90°= 15/xv.

On March 14th, 1924, she came again because of eye fatigue, increased nervousness and sleeplessness. It was observed that the eyes were more prominent than at the first consultation, and that the left lobe of the thyroid was slightly enlarged. A diagnosis of Basedow's disease was made and quinin hydrobromat with extract of ergot prescribed. On May 17th there was pronounced tachycardia, tremor of the hands, loss of weight and increased perspiration. Von Graefe's, Moebius's and Stellwag's signs were present. She was referred to Dr. Chas. L. Seitz, of The Walker Hospital Clinic staff, for a basal metabolic determination and to Dr. K. T. Meyer for a series of X-ray treatments. Dr. Seitz reported a basal metabolic reading of plus 59 per cent. On June 10th her general condition was improved, lessened exophthalmos and blinking and lid twitching. Lugol's solution was added to the treatment. On July 19th a third X-ray treatment was given each lobe and the thymic area treated. The basal metabolic reading decreased to plus 30 per cent. Her hospital card shows the following:

Temperature 98.6, pulse 80, hemoglobin 80, blood pressure 98/78. Urine, cloudy, specific gravity 1010, acid, albumin and sugar absent. The left lobe of the thyroid gland has not diminished much in size, altho the tumor mass feels softer. On October 11th a final X-ray exposure was made. Left lobe: 6 minutes, 2 mm. filter (Al.) 80,000 V., 5 M.A., 10 inches dist. Isthmus: 8 minutes, 3 mm. filter (Al.) 80,000 V., 5 M.A., 10 inches dist. Right lobe not treated. Basal metabolic reading 16.8 per cent, blood pressure 118/60, pulse 80.

Patient reported to me, saying she is almost free of all nervousness, that she sleeps and feels well, and wishes to lay aside her glasses since there is no longer eye fatigue.

The pathologic histology found in the thyroid gland in Basedow's disease is that of a variable diffuse parenchymatous hypertrophy. A similar finding may occur in adenomatous goiter with hyperthyroidism and increased metabolic rate. Hyperthyroidism expresses the clinical syndrome due to

the presence in the body of an excess of thyroxin, an iodin derivative, a powerful calorigenic agent. In addition to increased metabolic rate there is toxemia, giving rise to fatigue, nervousness, tremor, tachycardia, loss in weight, gastric crises and attacks resembling angina pectoris.

All of these symptoms disappear after extirpation of adenomatous goiter, but not if the case be one of exophthalmic goiter. The clinical syndrome in Basedow's disease is quite different from that seen in other goiters. We find early functional disturbances in the vegetative nervous system, especially that part of it connected with the eyes. Diagnostic eye symptoms: edematous swelling of the skin and subcutaneous tissues. Widening of the palpebral interspace, giving rise to staring eyes: Dalrymple's sign. A marked reduction in frequency of involuntary winking: Stellwag's sign. Upon directing the patient to look downward, the upper lid lags unduly behind, exposing a large area of sclera above the cornea: von Graefe's sign. Attempts at eversion of the upper lid finds more than natural resistance: Gifford's sign. Weakness in convergence for near objects, fatigue of the internal recti muscles: Moebius's sign.

The underlying cause in all of these manifestations is increased tonicity in the muscles and fibrous orbital tissue, the result of hyperexcitability in the sympathetic nuclei. Dilatation of the pupil after instillation of adrenalin is termed Loewe's sign. Extraocular eye muscle palsies have been met with in severe cases of exophthalmic goiter and find explanation in nuclear involvement. Corneal disease may result from traumatism where the eye protrusion is so great as to interfere with lid closure. But independent of this, where protrusion is not great, nutritional disorder the result of endocrin toxemia may set up corneal disease that, despite our treatment, may end in the loss of the eye.

Thyroid enlargement and exophthalmus are later manifestations of toxemia. The eye protrusions may be so slight as to go undetected, or reach so high a degree that the lids cannot be closed over the cornea. One eye may be involved at first and the second eye later. Stooping usually intensifies the eye prominence by adding to distention of the preexisting congested orbital vessels. Ophthalmoscopic examination at times reveals pulsation in the retinal arteries. By palpation over the closed lids or lifting the thyroid, one may experience a distinct thrill, while with auscultation a circulatory bruit may be heard.

Along with eye symptoms we have afebrile heart hurry, pulse beat over 100 per minute, which remains but little influenced by digitalis or sleep. Emotional disturbances, tremor in the hands and fingers, early fatigue, hyperhidrosis and increased basal metabolism belong to the symptomatology. Basal metabolism has come to occupy an important place in our procedure whereby one clinically determines the nature of functional abnormalities and the progress of instituted remedial measures. It is used to express the minimum rate of energy transformation prevailing in the body and is best measured at a time when an individual is not digesting food (14 to 16 hours after the last intake) and when lying at rest, so that voluntary muscles, other than those taking part in respiration, have been resting for not less than 30 minutes. Knowledge of the metabolic reading is especially helpful in differentiating mild cases of Basedow's disease from neurasthenia.

While exophthalmic goiter occurs more often in the female, I have met with very grave cases in the male.

Pathogenesis: Exophthalmic goiter is something more than excessive production of thyroid hormone. It has not been produced experimentally, and to account for the disturbances in the vegetative nervous system we assume an infection that has a selective nature for this system. Whether the infection is the result of microorganisms inhabiting the alimentary tract or to focal infection elsewhere, is unknown.

As predisposing causes, one may mention hereditary disposition, psy-

chic insult thru grief, fright or continued anxiety. Basedow's disease proceeds in cycles of intensity with periods of remission. The predominating tendency is toward recovery in most cases.

Treatment: This is hygienic, medicinal, X-ray and operative. In this age of multiplied specialism, the ophthalmologist is fully as competent as the internist to supervise the hygienic and medical treatment of these patients. Basal metabolic readings are made by one especially qualified to make them. Likewise, X-ray treatment is not given by the internist, but by one specializing in that line. The general surgeon is one who should do ligation and resection operations when such are indicated, but eyelid operations, when required to protect an exposed cornea, fall within the province of the eye surgeon.

501 So. 1st St.

NEUROPATHIC CONJUNCTIVITIS.

W. E. SHAHAN, M. D.

ST. LOUIS, MO.

This case was recognized as neuropathic in origin, but treated for five years for the corneal lesions. Staining by mercurochrome revealed a unique condition of the adjoining conjunctiva. Treatment with this drug caused very marked improvement, and excision of the affected conjunctiva produced an apparently permanent cure. Read before the Ophthalmic Section of the St. Louis Medical Society, December 12, 1924.

This case has been one of extraordinary interest in that it pursued an extremely chronic course over a period of years, resisting all ordinary forms of treatment, until its nature was indicated by a common color reagent and its course abruptly terminated by a simple surgical procedure.

The patient, a young woman of 25, while working at a telephone switchboard, felt something strike the left eye September 11, 1918. She was seen next day by the company's physician who found no foreign body or evidence of injury. He thought the eye looked as if it had been poisoned by something. The eye was treated by this man, who is a conscientious and very capable physician, almost daily as a mild conjunctivitis until October 16th when he referred the patient to me. At that time visual acuity was 20/15 right eye, 20/19 left eye. The left eye then had the appearance of a chronic bulbar conjunctivitis and was treated with ½% silver nitrate solution and various washes.

November 1st. Condition somewhat improved. Refraction:

R. +0.25 S.+0.37 C. Ax. 90°.

V.=20/15.

L. +0.50 S. V.=20/15.

Fundus examinations made from time to time, under various conditions, thruout the entire course of the disease, constantly showed nothing abnormal.

December 13th. There was no improvement and a searching examination with the ophthalmoscope and strong oblique light with Coddington and other magnifiers, by Dr. A. E. Ewing and myself failed to show any foreign body or other cause of the constant symptoms of irritation. At this time, however, a small area of keratitis was noted in the lower temporal quadrant of the cornea.

December 24. Symptoms of irritation, scratching, lacrimation, photophobia, etc., were more marked. There were then two fine grey lines across the cornea with small grey nodules along their margins and fine grey dots in different parts of the cornea. The case was now considered one of neuropathic keratitis.

February 10th, 1919. Two lines of superficial keratitis consisting of thin grey dots extended from lower limbus two-thirds across cornea. These were touched with 1% silver nitrate solution and the eye kept bandaged.

March 1st. Patient was seen in consultation with Dr. W. A. Shoemaker, who made a diagnosis of neuropathic keratitis and advised the use of a holo-

cain-zinc combination and Fowler's solution internally. For some time the patient had been taking $HgCl_2$ under instructions of her family physician, Dr. W. R. North. This had been given empirically in the face of a negative Wassermann and in the absence of any luetic symptom or history. Fowler's solution was substituted and continued for several months.

August 18. Referred to neurologist, Dr. F. R. Fry, who reported negative neurologic findings, but advised removal of left tonsil, which he thought diseased.

August 20th. Referred to rhinologist, Dr. H. B. Miller, who removed both tonsils and observed and studied her case for several years.

November 2nd. Dentist, Dr. James M. Gray, found teeth sound. An X-ray examination of teeth was made by Dr. L. R. Main in consultation with Dr. Gray.

January 27th, 1920. No improvement. Applied thermophore at 142° F. for one minute with 4 mm. contact surface to temporal quadrant of cornea. No pain. Epithelium destroyed over this area.

January 28th. Considerable pain last night. Destroyed epithelium about half replaced, having already covered over the chief grey line of keratitis, which is subepithelial.

January 29th. Epithelium all replaced. Not much improvement. Following this, injection of diphtheria antitoxin was contemplated in hope of benefit from the general reaction, when the patient took diphtheria and was vigorously treated for that. She made an uneventful recovery. The eye condition was unchanged.

October 7th. Vision, 20/48 left eye, without correction. Area of neuropathic keratitis lower nasal quadrant of cornea well defined.

October 21st. Internal treatment with quinin, iron, strychnin was instituted and kept up for several months, all other internal medication being discontinued.

January 18th, 1921. Touched grey areas of keratitis with 2% silver nitrate solution with subsequent temporary improvement.

February 18th. Small bulla over lower temporal quadrant of cornea.

February 19th. Applied thermophore at 150° F. for one minute to bullous area of cornea.

February 21st. Epithelium replaced and smooth.

July 26th, 1922. Treated in my absence by Dr. Hayward Post with optochin. Atropin solution was ordered used at home.

February 27th, 1923. Symptoms of irritation persisted. Treatment had become somewhat perfunctory. Holocain 1% seemed to give most relief but nothing terminated trouble. On this date for the first time a 2% mercurochrome solution was instilled and a striking and highly important reaction was observed. A large roughly triangular area of bulbar conjunctiva was stained a brilliant scarlet. This triangle had its base along the outer limbus and upon about 3 mm. of corneal epithelium. Its base was 6 or 7 mm. high and its apex terminated at the outer canthus. The patient was now wearing dark glasses; there was a chronic blepharospasm of the left eye. This eye was always closed. Fluorescein had frequently been used but never produced any conjunctival stain.

Attention was now turned to treating the evidently pathologic area of bulbar conjunctiva, which always stained a brilliant scarlet with mercurochrome. The edges of the stained area were sharply outlined and the area itself was observed under magnification, to be composed of innumerable minute dots. Photophobia and blepharospasm made the use of the slit lamp difficult and nothing of special interest was shown by it under these conditions. The brilliant surface stain always faded out after an hour or two.

Instillation of 2% to 4% mercurochrome alone and in conjunction with painting the diseased area of conjunctiva with 2% silver nitrate solution, were used with some apparent benefit until September 30, 1923, when subconjunctival injections of 2% mercurochrome solutions were begun. These injections were made under cocain adrenalin anesthesia, and were followed by marked improvement. There was

no great discomfort but rather marked conjunctival reactions with some chemosis. The triangular area of staining was generally reduced in size. The mercurochrome injected under the conjunctiva always disappeared completely within one or two days.

This treatment was continued until April 30, 1924. The subconjunctival injections of mercurochrome always produced a measure of relief but the condition always gradually returned. The triangle of diseased conjunctiva which reacted so sharply to the mercurochrome stain would become very small but never disappear, and then gradually return to its former size with corresponding increase in the patient's discomfort. The center of this diseased area was observed to be devoid of tactile sense. Vision 20/150 left eye, eye being forced open.

It was now concluded that it would be best to remove this area of diseased conjunctiva surgically, and this was done April 30, 1924. Two per cent mercurochrome was used after thoro anesthetization of the conjunctiva with 5% cocain in 1/4000 adrenalin, and the area of diseased conjunctiva outlined by the stain was dissected away. Owing to the needle punctures made in previous subconjunctival injections the conjunctiva was rather closely bound down in places. Healthy conjunctiva, which never stained with mercurochrome, was loosened and drawn over the denuded area by means of three sutures and the eye bandaged. The conjunctiva removed was sent to Dr. Harvey Lamb for microscopic examination. Dr. Lamb's report showed only ordinary inflammatory changes such as might come from any mild conjunctivitis or from the needle punctures.

For several days following the operation the patient suffered from violent gastric disturbances with inability to retain food. This was finally quieted by one grain doses of veronal given three times a day.

May 15th. Patient came to the office in excellent condition. Complete disappearance of symptoms of irritation. No photophobia. Had discarded colored glasses and eyes were open about equally.

May 20th. Vision 20/19 right eye, 20/19 left eye. Apparently completely recovered. Mercurochrome 2% used in left eye did not stain any part of bulbar conjunctiva or cornea.

September 1st. Patient resumed work for the first time since eye trouble began.

December 9th. Recovery has apparently been complete. Patient is working daily and is not handicapped in any way. The eye requires no treatment. Refraction on this date:

R. +0.12 C. Ax. 90°. Vision, 20/15.

L. —0.25 S. +0.75 C. Ax. 85°. Vision, 20/15. Maddox Test: Orthophoria at twenty feet.

It will be noted that from September 11, 1918, to February 27, 1923, all treatment, including the thermophore treatment, was directed to the cornea on the theory that the conjunctivitis was secondary to the keratitis. The mercurochrome reaction, however, showed that the primary trouble was in a localized area of the conjunctiva. When this diseased area of conjunctiva was radically removed all other symptoms promptly and completely disappeared.

Addendum: April 28, 1925. Patient has been continuously at her work, the eye giving no further trouble.

OSTEOMA OF THE ORBIT.

CHARLES A. YOUNG, M.D.

ROANOKE, VA.

In this case, a tumor in the orbit, noticed for two years, followed opening an abscess, ascribed to infection from cells of the ethmoid. Motor driven burrs proved inefficient, and it was separated by a hand drill. No break was found in the orbital wall.

Dr. Arthur J. Bedell having so recently reviewed this subject (American Journal Ophthalmology, February, 1924, page 126) I will confine this paper to conditions found in the case herewith reported.

Most authorities contend, justly, that there is more or less danger of meningitis from a fracture into the anterior fossa; with this in mind I attempted to remove the tumor with motor driven bone burrs which proved entirely inadequate—the tumor being so dense that the burrs did little more than polish the tumor. The bone burrs having failed, recourse was had to a bone drill to weaken the base of the growth which proved to be very effective and then the tumor was rocked loose.

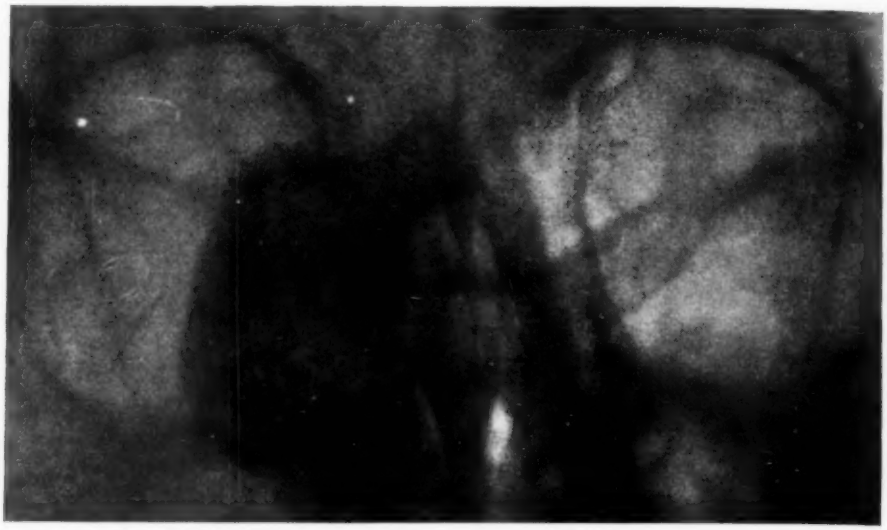

Fig. 1.—X-ray (front view) showing tumor of right orbit before operation.

Fig. 2.—X-ray (side view) showing tumor of right orbit before operation.

Case: H. M., colored man, age 21 years, was first seen February 18th, 1924, complaining of a growth in the right orbit which was causing pain in the right temple. Patient had noticed the growth shortly after Dr. E. G. Gill opened a deep orbital abscess between the right eye and the nasal wall of the orbit, two years ago. This abscess was thought to be due to an extension from infected ethmoidal cells. The tumor has gradually grown to its present size.

Examination shows the right eye displaced temporally and tightly wedged between the tumor nasally and outer wall of the orbit temporally. No proptosis present. The tumor itself, which is between the right eye and the inner wall of the orbit, is very hard, extending from upper and inner angle of the orbit to a point on the inferior rim of the orbit just above the infra-orbital foramen, outlines of which are very well shown by the X-ray photograph (Fig. 1). The skin is tightly stretched across the tumor; under the skin the internal canthal ligaments can plainly be seen.

Pupillary reactions and tension normal in each eye. Vision without glasses O. D.=6/15 plus two. O.S.= 6/7½ minus one. Ophthalmoscopic examination negative. No diplopia. Muscle balance; distance, no hyperphoria, exophoria two degrees; near, (33 cm.) no hyperphoria, exophoria twenty degrees. Wassermann negative. Examination of nose and throat by Dr. E. G. Gill negative.

March 4, 1924, Dr. J. F. Armentrout gave the patient a preliminary Roentgen treatment using a 200,000 volt machine with setting 200 peak kilovolts using .78 mm. copper and 1 mm. aluminum filters, skin target distance 22 inches, 5 milliamperes for 45 minutes to area about the osteoma.

Operation March 19th, 1924, under ether anesthesia, at Burrell-Memorial Hospital.

An incision was made thru the skin, canthal ligaments and periosteum; the periosteum was dissected from the osteoma which had an ivory like con-

Fig. 3.—X-ray (front view) showing right orbit after removal of osteoma.

Fig. 4.—X-ray (side view) showing right orbit after removal of osteoma.

sistency. An attempt was made to remove the tumor with motor driven bone burrs. The bone, however, was so dense the burrs had practically no effect.

With hand driven bone drill several holes were drilled into the tumor to weaken it, then ronguers were used to break down the mass and after taking off the top of the tumor the remaining portions were rocked and removed in two sections as shown in photograph. (Fig. 2.) A drain was inserted and the periosteum, canthal ligaments and skin brought together with interrupted sutures.

The shell of the tumor ranged from one-fourth to one-half inch in thickness, the central portion being made up of granulation tissue and some spongy bone. After the tumor was removed no defects could be seen or felt in the bony walls, all the bony structures being smooth and normal in their relations.

Postoperative course normal and at the present time there is very little scarring.

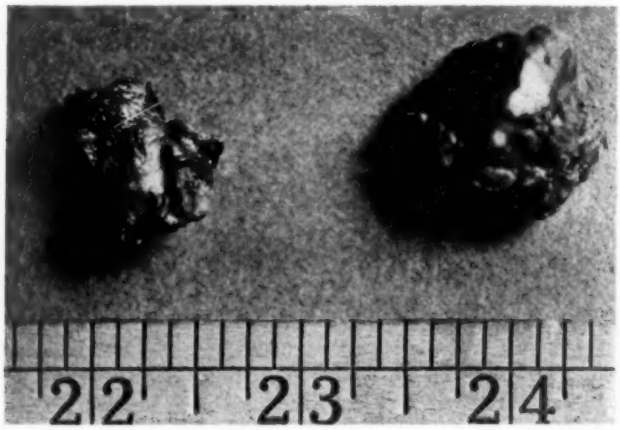

Fig. 5.—Showing the two portions of tumor removed. The smooth whitish area on fragment to right due to use of bone burr.

Pathologist's Report. Examination of tissue by Dr. Eugene A. Case as follows: "Specimen consisted of small fragments of bone which we decalcified and sectioned. Microscopically they are composed of bony trabeculae with a fibrillar tissue between. This fibrillar material is not very cellular and judging from your gross description and the microscpic findings I would say that it was an osteoma or possibly an exostosis following the irritation associated with his infection. The fragments are certainly not malignant."

NONTRAUMATIC HOLES OF THE FUNDUS.

HUNTER W. SCARLETT, M.D.

PHILADELPHIA, PA.

A sharply localized depression in the fundus of an otherwise normal eye, was observed in a patient giving no history of injury. The bottom of the hole had a refraction 3. or 4. D. greater than its edge. Similar cases and the hypotheses advanced to explain them, are reviewed.

Holes of the fundus, especially of the macular region, are ofttimes observed following severe traumatism of the orbital and periorbital structures. They are usually accompanied by irregular rents in the choroid and retina. The rents, however, are commonly present, without the holes, in wounds of the face and head. Macular degeneration from preexisting inflammatory conditions, may simulate these holes on gross examination, but are different when studied in detail.

Nontraumatic holes on the other hand, are not so commonly encountered, and their location in the macula is more unusual than the traumatic type, as the case herein reported demonstrates.

The etiology of nontraumatic, nonmacular holes of the fundus, is not definitely known, altho de Schweinitz[1] says they may be caused by the vitreous becoming attached to the retina thru an inflammation or hemorrhage, when the occurrence of traction produces a hole; while Fuchs[2] attributes them to retinochoroiditis.

Most of the literature reviewed, shows detachment of the retina as an accompanying factor. Highet[3], discussing a case which had three recurrent detachments in four months, says there must have been a hole in the retina which allowed fluid to leak thru and balloon it out. This necessarily meant a fluid vitreous.

In discussing hole formation with spontaneous detachment, Hehr[4] considers it was due to the following factors. (A) Tears between the retina and choroid. (B) Retraction process from a membrane between the vitreous and retina. (C) Inflammatory and tissue injury action of subretinal fluid.

Yane[5] reports the case of a child four years of age, with a coloboma in the right eye, extending from the disc to the macula; and a macular coloboma in the left. No mention, however, is made of a detachment. The condition was probably congenital.

In Batten's[6] case, both eyes showed symmetric patches, covering almost the entire macular region, in which there was complete absence of retinal tissue. The margins of these areas were clearly defined, while the floors were covered by a thin layer of choroid, with choroidal vessels crossing it.

From the description of these cases, the depth of the areas was not appreciable, as no mention was made of it.

A similar case reported by Agatston[7], showed a complete absence of retinal tissue with choroidal vessels and pigment in front of the white sclera.

Chambers[8], however, in discussing a case he reported, says the fundus of both eyes showed pearly white depressed areas in the macular regions, which were two discs diameter in width, nearly round in shape, with steep sharply defined edges, and having a depth of three diopters below that of the surrounding fundus. Traversing the base of this depression were some straight vessels, which the author assumed to be branches of the long ciliary. Retinal vessels could be traced to the margin of the defects, and were then lost, showing the retina to have been absent over this area. No pigment was present and the rest of the fundus was negative.

This case resembled one of central choroidal atrophy, but the absence of pigment precluded simple atrophy, while the punched out appearance favored the diagnosis of coloboma of the choroid.

In contrast to this patient, Reese[9] showed me one with a true macular atrophy, having a depth of three diopters, marked from the level of the thick encircling ring of pigment, to the floor of the white sclera. Traversing the bottom of this depression.

were two large choroidal vessels, while a small retinal vessel could be seen bending over one end of a bridge of pigment which divided the patch into two unequal defects. The history somewhat complicated the etiology of this condition, as the patient said he had been struck in the eye six years previously by part of a tree stump he had been chopping.

The fundus picture was more that of a lesion due to some systemic cause, than from a trauma, as there were none of those characteristic linear semicircular rents, which are usually associated with a direct or indirect contusion of the eyeball. Also the arrangement of the pigment, and the scooped out appearance of the depression, was against traumatism being the causative factor.

In such cases, the compensation question must be carefully weighed, especially where trauma has been present.

According to Lister[10], holes of the fundus may be divided into macular and peripheral, again subdivided into traumatic and nontraumatic. Four theories are mentioned by him, as causing the nontraumatic variety.

1. *Cystic Degeneration.* There may be one large cyst, or several smaller ones which have coalesced. These may rupture from a sudden shock, or from traction, by an adherent vitreous leaving a depression at the site of the former cyst.

2. *Osmotic Theory of Raehlmann* which does not appear tenable.

3. *Elschnig's Theory* of pegging out of the retina from the choroid; because of a preexisting retinochoroiditis and detachment, which may have taken place either by traction from within or pressure from without. This produces a hole in the retina, corresponding to the position of the spot of the retinochoroiditis. If the retina is too tough to tear, it will remain adherent to the choroid in a funnel shaped fashion. If the detaching force is from without, there will be only one hole produced, because pressure on the retina will become equalized once the fluid has perforated it; while if the detaching force is from within, as from a contracting vitreous, there may be several holes produced at the spots where the retina is attached.

4. *Leber and Nordenson's Theory* of contraction of fibrous bands in the vitreous, following hemorrhage from the retina, or an inflammatory process such as retinochoroiditis. Here the vitreous becomes attached to the retina from one of the causes mentioned, subsequently contracts, and holes with detachment result.

A hole may be caused by the contraction of a fibrous vitreous without the presence of a choroiditis, as was observed by Lawford.

In 1882 Leber, in his lectures at Heidelberg, said that a sudden detachment of the retina could not occur without the presence of a hole, therefore it was important to determine whether a detachment had occurred suddenly or gradually. The importance of this statement may be further emphasized if we add to it that of Lister, who says that no case has ever been reported in which a tumor causing a detachment, was associated with a hole in the retina.

If we could always be certain in cases of detachment of the retina showing a hole, that no tumor was present, we could more readily advise as to the nonremoval of the eye, especially in the absence of any etiologic factor such as trauma, choroiditis, or iridocyclitis.

Collins has said, the reason holes of the retina occurred without detachment, was because the vitreous was not degenerated, therefore was not fluid and could not pass thru a defect to the rear of the retina and balloon it forward.

CASE HISTORY.

Miss K. S., 21 years old, was first examined 3/12/24, because of general malaise and temporal headache of one month's duration, coming on early in the day and getting worse toward evening. She had never had her eyes examined nor worn glasses. Her past history was negative except for a hare lip operation in early youth. Vision O. D. 20/30. O. S. 20/20.

Lids, conjunctiva and lacrimal apparatus were healthy, cornea clear, pupils equal, and reactions normal. Ocular movements were full and eyeballs were stationary under cover. Muscle balance was normal.

Ophthalmoscopy: R. Media clear, disc slightly oval vertically, well defined and of healthy color. Physiologic cup shallow, macular reflex normal, periphery and vessels negative. About 1¼ d.d. to the temporal side of the disc, and slightly below the level of the horizontal plane, there was a round, sharply outlined depression, about 2/3 the size of the disc. The depth of this depression or hole measured between 3 and 4 diopters with the ophthalmoscope, and gave at first glance the impression of a broadly excavated glaucomatous cup. The clearly defined whitish rim resembled that of the normal scleral ring of the disc, while the appearance of a small dab of pigment along the inferior temporal border, was not unlike that often seen in the choroidal ring.

The walls of the hole sloped funnel shaped toward the background of whitish sclera stippled with brownish pigment resembling the perforations of the lamina cribrosa. The nasal wall, about midway between the top and the bottom was pierced by a choroidal vessel which bifurcated immediately, one branch coursing upward, the other down, until they reached respectively the upper and lower points of the floor in the vertical meridian, where they again disappeared by sharply piercing the sclera.

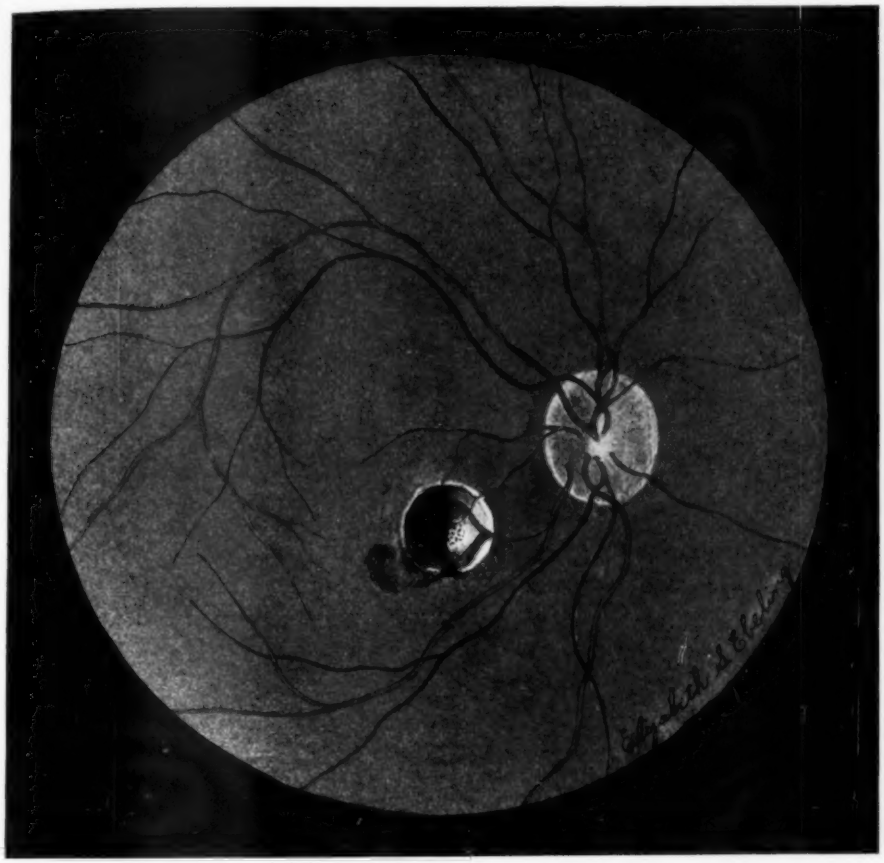

Fig. 1.—Hole in fundus probably due to cyst formation and rupture.

Two small branches from a macular artery bent over the upper border, and ended or disappeared from view at the

bottom of the hole, while a branch from the inferior temporal artery gently wound its way over the nasal edge, dipt down toward the center, then turned and emerged over the infero-temporal border. All three branches presented a decided kink where they twisted over the rim of the depression.

A small, irregular patch of pigment was situated just below and to the outer side of this hole.

Comment. The interest attached to this unusual fundus defect, lies in the sharp definition of its border, the arrangement of the vessels, and the lamina cribosa like appearance of its floor, causing the whole to resemble an excavated disc.

Etiologically it is impossible to definitely determine its origin, altho from the appearance of its sharply cut edges, and the absence of any great amount of choroidal pigment, it might be classified as due either to cyst formation with rupture, thus producing a hole in the fundus; or, as Elschnig described, to a pegging out of the retina, from a preexisting retinochoroiditis. In this latter instance, the pegging force must have been from without, as only one hole was present. On the other hand, the presence of a hare-lip might be used as an argument toward a congenital etiology.

REFERENCES.

1. De Schweinitz. Text Book, 10th edition, p. 478.
2. Fuchs. Text Book, 12th edition, p. 748.
3. Highet. Recurrent Detachment of Retina. Brit. Jour. of Oph., V. 8, p. 226, 1924.
4. Hehr. Klin. M. f. Augenh., 1920, V. 64, p. 142.
5. Yane. Klin. M. f. Augenh., V. 68, p. 262.
6. Batten Trs. Ophthal. Soc. Unit. Kingd., 1922, V. 42, p. 109.
7. Agatston. Congenital Coloboma of the Macula., Arch. of Ophth., V. 48, p. 377.
8. Chambers. Bilateral Coloboma of the Macula., Brit. Med. Jr., Sept. 23, '22, p. 564.
9. Dr. Warren S. Reese demonstrated this case privately.
10. Lister. Holes in the Retina and their Clinical Significance, Brit. Jr. of Ophthal., January, 1924, p. 1.

MODIFICATION OF THE SWEET LOCALIZING APPARATUS.

W. E. Roberts, Roentgenologist.

CHARLOTTE, N. C.

This modification is the introduction of rack and pinion adjustment of the vertical and anteroposterior movements of the ball localizer in front of the cornea. It is claimed to give greater accuracy and to avoid movements on the part of the patient.

The following described modification of the Sweet Localizing Apparatus for the localization of foreign bodies in the eye has been devised with the object in mind of reducing, as far as possible, the various sources of error which are experienced in doing this branch of radiologic work. The variation of a millimeter often means the losing or saving of an eye, and a great part of the responsibility often rests on the roentgenologist. It seems that any reduction of error, no matter how slight, would be extremely helpful in a procedure accompanied by so many pitfalls as this one. It is useless to say that all reduction of error is a distinct advantage to accurate work.

In the use of the Sweet apparatus, the adjustment of the ball of the localizer to the center of the cornea is accompanied by some difficulty. The only means of adjustment is by sliding the apparatus up or down on the vertical post. This procedure itself is apt to move the ball out of alignment with the vision as directed at the fixed target. When the operator is fortunate enough not to disturb the alignment of the localizing apparatus, the difficulty of properly tightening with the set screw, to leave the ball exactly opposing the center of the cornea, immediately confronts one. In place of this sliding apparatus, which naturally is accompanied with a great possibility

of error, a fine rack and pinion similar to the adjustment of the microscope was substituted. This permitted of easy and extremely accurate adjustment to the center of the cornea without danger of disturbing the alignment of the apparatus.

Another and possibly greater source of error with the Sweet instrument is the method of releasing the pressure of the ball of the localizer from the eye, and of removing it an accurate distance from the cornea. This is accomplished by means of a trip spring and catch with the Sweet instrument. Here several factors are likely to produce additional error. The first likelihood of error in this step is the noise accompanying the release of the spring. This invariably caused the patient to move, even tho the head was fastened by means of clamps. Especially was this true of children. Even in adults the large majority would move. Sometimes the movement was very slight, but nevertheless added to the list of possible errors.

In place of this trip spring and catch, is substituted a rack and pinion, which makes possible the noiseless manipulation of the horizontal bar carrying the ball and cone. Along with this arrangement on the horizontal bar we have placed a centigrade scale which permits of removing the ball and cone an accurate distance each time. With the old instrument, the release of the spring was not always accomplished by the removal of the ball and cone an accurate distance. This was due to several factors. As the spring aged it lost its elasticity, thus not forcing the horizontal bar back to the catch. The friction also may have been a variable

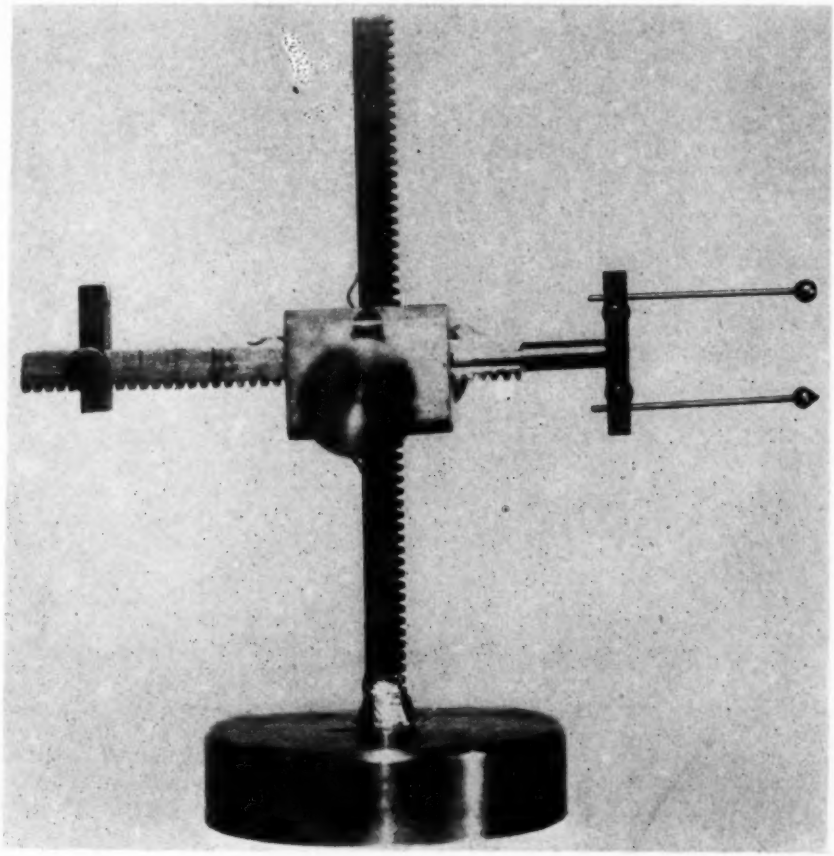

Fig. 1.—Sweet localizing apparatus modified by addition of rack and pinion movements vertical and anteroposterior. (Roberts).

factor. A new instrument of the Sweet type was tested, and seldom did it accurately move the horizontal bar of the instrument back the ten millimeters as supposed in accordance with the arrangement of the instrument. The increase of length of the bar so as to permit of moving it any desired distance instead of a fixed distance, was thought to be a distinct advantage for the following reason. Many patients have unusually long eye lashes, and in blinking the eye after removal of the ball and cone, 10 mm. was found not to be sufficient to allow them to do this normally without hitting the cone with the lashes and tending to make them move.

We claim for this instrument that it reduces the possibility of error in localization of foreign bodies in the eye in four different ways. First, by making vertical adjustment a rack and pinion instead of a sliding arrangement. Second, by substituting the rack and pinion on the horizontal bar for the trip spring and catch of the old instrument. This arrangement allows two reductions of possible error: (a) That due to movement of the patient when the noise of the sudden release of the spring is heard. (b) Permits of moving far enough back to allow any patient, no matter how long the eye lash, to blink the eye in a normal manner without interference. Third, the millimeter scale permits the operator to accurately move the horizontal bar to any distance, overcoming the possibility of loss of elasticity of the spring or variation in resistance due to friction.

INTRAOCULAR STEEL INVASIONS OCCURRING IN TEN YEARS' PRACTICE.

FRANK ALLPORT, M. D.,

CHICAGO, ILLINOIS.

The brief details of 223 cases of intraocular steel invasion, that have occurred in the author's practice during the last ten years, may be of interest to colleagues who are engaged in the same kind of work. They are submitted stripped of needless details, preceded by general remarks and explanations and followed by brief summaries. The latter give occupation of the patient, work engaged in when injured, form of magnet operation and results.

In order to economize space, I shall endeavor to mention only essential facts in the recitation of the following cases.

Iritis or iridocyclitis have followed a vast majority of these operations. Detached retina, vitreous and other intraocular pathologic changes have occurred many times. It seems needless, therefore, to consume space in recounting these frequent conditions. I shall give briefly the following data.

1. Date of first visit to my office.
2. Initials of patient.
3. Occupation.
4. Age.
5. Which eye.
6. Cause of accident.

It will be noticed that hammering is by far the greatest cause of these accidents. This may happen while driving a nail, cutting steel, etc., but they will all be called "hammering" in these records.

7. Important ocular conditions found.
8. X-ray findings.
9. Brief details of operation.
10. Results.
11. Size of foreign body, measured in its widest parts.

None of these patients wore goggles. Many patients were treated by other doctors (usually the shop doctor), before coming to me. Some of them did not come to me when told. Some would not follow my advice at first. Some left the hospital before permission was given. Some did not make subsequent visits to my office when told. All were told to visit me from time to time in order that their cases might be kept under observation, but many disobeyed. I also tried to see them all after many months had elapsed in order to ascertain the end results, but this desirable investigation frequently failed. I believe, however, that it is only reasonable to assume that if these cases are not heard from again they are doing well, for this class of men are usually great complainers, and are

generally eager to establish grounds for collecting damages. I am glad to say that in none of these cases has a sympathetic ophthalmia appeared.

It will thus be seen that the surgeon is considerably handicapped in handling such cases by the patient, his family or his friends, not being willing to follow advice. This, however, has to be expected in dealing with a class of people, most of whom are densely ignorant and superstitious foreigners; many of whom cannot speak even the simplest English. Details of this nature, however, cannot be mentioned in narrating the brief histories of so many cases; it would occupy too much space. Mere skeletons of cases are given, and no mention is made of unheeded advice, refused cataract operations, amputations of prolapsed irises, iritis, secondary glaucoma, hospital and office treatment, etc., etc. Every effort has been made to condense these reports into the briefest space, and to mention only the very essential details.

I have 27 more steel specimens in preservation for which I can find no histories. These of course I have excluded from this group. I do not know why these omissions have occurred, but they could be accounted for by mistakes in filing, or by the various ways men of this kind have of spelling their names. I regret this exceedingly, but it cannot be helped. I might gather the data together by a long and tedious overhauling of the hospital (St. Luke's) records, but I feel this to be unnecessary, as sufficient material has been accumulated for this article.

Why we do not always get a response to the magnet is difficult to say. Of course the steel is sometimes outside the eyeball, in the socket, orbit, or it is tightly wedged in the sclera, and does not come out. It would be thought that in both these instances, especially the latter at least, pain would be elicited, but this is not always the case. The steel may be thickly covered with exudate, or tied to the walls by bands of adhesions; but this would seem to be no hindrance to at least pain occurring on the approach of the magnet. In this series of cases, however, where no pain response was produced, and where removal was not effected, the steel (after the globe was removed) was sometimes found, uncovered by any material amount of exudate, lying freely in the vitreous. This seems incomprehensible, for I am very careful to be sure that the current is on, by testing the magnet every moment or two. Still, of course, omissions may have occurred.

In general I have been satisfied with Sweet's hand magnet, but in cases where I was unsuccessful have used the giant magnet, but it has not accomplished more than Sweet's.

If the method of Haab is to be pursued, and small objects are to be drawn from the extreme limits of the vitreous chamber, thru the entire length of the eyeball, the giant magnet of Haab is doubtless the best instrument. But, if the method proposed by me years ago is to be followed, then Sweet's hand magnet will be sufficient. This method is, as I have before enunciated, as follows:

If the steel has passed thru the cornea and lens, and is in the vitreous chamber; and the wound is still open, and the piece is not too large (here judgment and experience play an important part), it may be removed thru the point of entrance. If it is so large that great damage would probably be produced by its liberation, it should be removed thru the sclera. If it entered thru the sclera, it should be removed thru the sclera. So much for recent unhealed cases.

In healed cases, if the steel is in or anterior to the lens, it should be remover thru the cornea. If it is posterior to the lens, it should be removed thru the sclera.

I have no question in my own mind that these are the rules that should be obeyed.

Almost all fragments of steel in this series, that have failed to respond to the magnet, and the eye has been enucleated, and the steel found, have been tested and were magnetic. I think only one was nonmagnetic.

An eye that is evidently ruined should be removed at once. It saves much bodily and mental suffering, weeks and months of hospital and home care and invalidism, quickly re-

stores the patient to his earning capacity and normality of living, and saves much money.

Results show that steel should be removed from the eye as soon as possible after the accident. Infection and trauma are thereby robbed proportionately of their power. Results also show (very materially) that the invasions of large pieces of steel usually ultimately require enucleation; while small steel invaders are frequently followed by visual and ocular salvation, if skilfully removed and proper subsequent treatment instigated.

Much care should be observed in case it is necessary to remove a traumatic cataract, because of intraocular pressure, etc. The hyaline membrane is usually broken, and the vitreous escapes easily. Eye speculums are dangerous, as they press on the eyeball unless they are properly lifted from the globe. I believe that Fisher's retractors are safe. The corneal opening should be broad enough to permit free egress of lenticular substance without much pressure; and I, personally, use an anterior chamber irrigator to wash out the debris.

When a traumatic cataract is a few weeks old it is usually not even semifluid, and frequently not even gelatinous, it generally becomes quite hardened; not like a senile cataract of course, but still usually much too hard to permit of its easy egress thru even a wide keratome opening, and forceful pressure on the eyeball should not be used under such circumstances. Therefore, I use a Graefe knife, and make a fairly goodsized opening, use the retractors instead of a speculum; and extract the lens with unusual care, and wash out the anterior chamber with an irrigator. But it is done very gently, as traumatic cataracts are treacherous, and vitreous is easy to lose.

My reasons for not always operating ultimately in favorable cases of traumatic cataract, for the restoration of vision, have been stated before, but I will venture to briefly repeat them. These patients are almost always laboring men (there are only three women in this series), where surgical services are paid for by either an insurance company or the employer. A large proportion of them sue for damages either before industrial commissions or the higher courts. Most states provide for such damages without compensation laws. These laws estimate visual losses *without* glasses; and of course a man whose cataract has been removed cannot possess fair or good vision unless he wears glasses.

Suppose a man's eye is injured, and he develops cataract, and either the insurance company or the employer pays a surgeon to operate, and he obtains a perfect result, the courts would make no allowance for this vision restored by operation and glasses. He would be awarded *full* damages for total industrial blindness of one eye, and all the money the insurance company or the employer have paid for surgical services, hospital, time, etc., would not benefit them one dollar's worth. I can hardly advise companies who employ me to assume this extra financial burden, unless they thoroly understand the situation and desire to have the work done for humanitarian purposes. Besides this, the patient hardly ever wears his glasses, even after he gets them; the refraction of the two eyes is so *extremely different.*

One sometimes wonders why these cases of traumatic cataract do not yield better results after operative procedures. It must be remembered that they have been subjected to traumas of greater or lesser degree. Detached retina, choroidal rupture, iritic or ciliary laceration and many other lesions may have occurred. And then after the trauma, keratitis, iritis, cyclitis, retinitis, choroiditis, neuritis, and other conditions are frequently present. This means that we are operating frequently on a pathologic eye, in diseased soil, and that we should not be very optimistic as to operative results.

To economize space, I do not write "years" before or after the patient's age. The age will be given in simple figures, after the occupation. The abbreviation for "Machinist" is Mach't; for "Laborer" is Lab'r. I shall indicate which eye is injured by the letters "L.E." or "R.E." Where no date is given as to the date of the injury,

it may be assumed to have occurred upon the same date as the patient came under my care. If it occurred upon a prior date, I will so specify, as for instance, "Hurt Oct. 12," etc. The means by which the injury occurred will follow next, in one word if possible, as for instance, "Hammer," meaning that the injury was produced by some kind of a hammering process. The part of the eye injured should come next, as "Scleral wound," "Corneal wound," etc. This of course indicates the apparent and gross injuries, and does not as a rule include intraocular injuries, posterior to the lens. X-Ray findings are indicated as follows: "X-R Pos." and "X-R Neg." instead of "Positive" or "Negative." Magnet operations are indicated as follows: A magnet operation performed by the Anterior Route, or thru the cornea, will read "Mag. Op'n. Ant. R'te." A magnet operation performed by the Posterior Route, or thru the Sclera, will read "Mag. Op'n. Post. R'te." If the steel is withdrawn, I say "Successful"; if it is not withdrawn, I say "Unsuccessful." The last time I have seen the patient, I give the date and the amount of his vision; the letter "V" standing for "Vision," and "L.P." standing for "Light Perception." The abbreviation used for "Cataract" is "Cat."; "Cataract Operation is "Cat Op'n"; "Panophthalmitis" is "Panoph's."; "Enucleation" is "Enuc'n." The size of the foreign body will be stated, for instance, 2 x 1. meaning that it is 2 millimeters in length one way, and one millimeter the other way.

I now proceed to outline the histories of my 223 cases, which would be 250 if I could find the records of the other 27 cases. Then I endeavor to gather a few statistical deductions from the various histories.

ABSTRACT OF CASES.

1. Jan. 5, '14. J.C. Mach't. 34. L.E. Hurt Jan. 2. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 1, V. 20/30. 1x1.

2. Jan. 13, '14. W.F. Lab'r. 30. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 3, '15, V. L.P. 4x3.

3. Feb. 13, '14. A.Y. Mach't. 23. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Panoph's. Enuc'n. 4x2.

4. Mch. 14, '14. J.M. Steam Fitter. 25. L.E. Hurt Mch. 12. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 29, V. 20/30. 3x2.

5. Mch. 19, '14. R.J. Tool Shop. 16. L.E. Hammer. Cornea and lens injured. Can see steel in lens. Mag. Op'n. Ant. R'te. Successful. Cat. Op'n. Dec. 9, '22, V. with glass 20/20. 1½x1½.

6. Apr. 6, '14. R.E. Boilermaker. 26. R.E. Hurt Apr. 5. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 23 Cat. Op'n. June 20, V. fingers at 8 ft. 3x2.

7. Apr. 14, '14. G.Z. Flue setter. 35. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 27, V. L.P. ½x½.

8. Apr. 17, '14. J.P. Lab'r. 21. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Enuc'n. 11x4.

9. May 2, '14. M.N. Boilermaker. 22. R.E. Hurt Mch. 4. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Cataract; detached retina. Sept. 1, V. L.P. 9x5.

10. June 20, '14. A.S. Lab'r. 32. R.E. Hurt June 12. Hammer. Scleral entrance. Lens dislocated. Detached Retina. X-R Pos. Eye collapsed. Enuc'n.

11. July 2, '14. G.E. Mach't. 30. L.E. Hurt June 29. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Eye became atrophied, soft and irritable. Enuc'n. 5x3.

12. July 7, '14. F.R. Mach't. 42. R.E. Hurt June 8. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. There is an opaque streak where foreign body passed thru lens. Dec. 3, V. 20/30. ½x½.

13. July 20, '14. C.R. Stripper. 26. R.E. Hammer. Cornea and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 7, Cat. Op'n. Jan. 5, '15, V. with glass 20/70. 3x2½.

14. Aug. 4, '14. M.M. Mach't. 35. L.E. Hurt Aug. 1. Hammer. Cornea, iris and lens injured. Panoph's. Enuc'n. ½x½.

15. Aug. 12, '14. M.W. Handy man. 25. L.E. Hammer. Sclerocorneal wound. Eyeball collapsed. Enuc'n. 15x9.

16. Aug. 17, '14. T.C. Boilermaker. 22. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Unsuccessful. Panoph's. Enuc'n. Steel in sclera. 3x1.

17. Aug. 24, '14. J.D. Lab'r. 35. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 3, V. 20/20. 7x2.

18. Sept. 10, '14. W.K. Lab'r. 26. L.E. R.E. has been removed. Hurt Aug. 24. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 15, V. 20/20. 2x1.

19. Oct. 11, '14. R.A. Mechanic. 25. L.E. Hammer. Cornea, iris and lens injured. X-R

Pos. Mag. Op'n. Post. R'te. Successful. Jan. 3, '15. Cat. V. L.P. 3x1.

20. Oct. 14, '14. K.G. Wire binder. 28. L.E Hurt Oct. 7. Hammer. Cornea and lens injured. X-R Neg., but can see track of foreign body thru lens. Mag. Op'n. Post. R'te. Successful. Nov. 17, Cat. Op'n. Jan. 4, '15, V. with glass 20/30. ½x½.

21. Oct. 25, '14. H.F. Mach't. 32. R.E. Hurt Sept. 18. Hammer. Scleral wound. Rupture of Choroid and Retina. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 6, '15, V. 20/40. 3x2.

22. Nov. 7, '14. J.P. Mechanic. 34. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 5, '15 Cat. developing. V. 20/100. ½x½.

23. Nov. 27, '14. W.O. Die worker. 27. L.E. Hurt Nov. 26. Hammer. Scleral wound. X-R both Pos. and Neg. Mag. Op'n. Post. R'te. Successful. Mch. 11, '15. Detached Retina. V. L.P. 1x1.

24. Dec. 28, '14. O.K. Carpenter. 22. L.E. Hurt Dec. 24. Hammer. Scleral wound. X-R Pos. Panoph's. Enuc'n. 3x2.

25. Jan. 13, '15. M.C. Lab'r. 25. R.E. Hurt Jan. 11. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 3x2.

26. Feb. 10, '15. W.D. Mach't. 27. L.E. Hurt Feb. 6. Hammer. Cornea, iris and lens injured. Hypopyon. X-R Pos. Mag. Op'n. Anterior R'te. Unsuccessful. Enuc'n. Steel in sclera. 1x1.

27. Feb. 21, '15. P.F. Boilermaker. 40. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 15x7.

28. Mch. 19, '15. F.K. Lab'r. 39. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Apr. 12, V. 20/200. 4x2.

29. Apr. 1, '15. C.A. Car repairer. 32. L.E. Hurt Mch. 30. Hammer. Scleral wound. Hypopyon. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 7, eye quiet. V. total blindness. 4x3.

30. Apr. 11, '15. A.F. House wrecker. 47. R.E. Hurt Apr. 9. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. Apr. 28, V. 20/30. 1x1.

31. Apr. 15, '15. A.P. Lab'r. 21. R.E. Hurt Apr. 12. Hammer. Cornea, iris and lens injured. X-R Pos.. Mag. Op'n. Post. R'te. Successful. May 15, V. fingers at 1 ft. 12x1.

32. Apr. 25, '15. J.F. Mach't. 22. L.E. Hurt Apr. 9. Hammer. X-R both Neg. and Pos. Corneal scar. Cat. Mag. Op'n. Both Ant. and Post. R'tes. Unsuccessful. Panoph's. Enuc'n. Found steel in vitreous. ½x½.

33. May 20, '15. E.L. Boilermaker. 25. R.E. Hammer. Sclerocorneal wound. Foreign body can be seen. Mag. Op'n. Ant. R'te. Successful. June 17, lens clear; detached retina. V. Absolute blindness. 6x4.

34. June 27, '15. N.R. Mach't. 21. R.E. Hammer. Cornea and lens injured. X-R. Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. ½x½.

35. July 2, '15. G.D. Lab'r. 34. R.E. Hammer. Eyeball collapsed. Sclerocorneal wound X-R Pos. Enuc'n. 13x6.

36. July 10, '15. T.B. Stripper. 23. L.E. Hurt June 9. Hammer. Corneal wound. Steel in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. Jan. 3, '16, V. 20/20. 1x1.

37. Aug. 3, '15. E.C. Section hand. 50. L.E. Hurt Aug. 2. Hammer. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. Dec. 2, V. 20/20. 3x1.

38. Aug. 4, '15. J.E. Iron worker. 26. R.E. Hurt July 28. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 3, V. 20/200. 2x1.

39. Aug. 15, '15. J.M. Steel worker. 35. L.E. Hurt Aug. 11. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 3, V. 20/70. 3x2.

40. Aug. 21, '15. W.S. Tank Shop. 17. L.E. Hammer Wound at Sclerocorneal junction. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 3, V. L.P. 4x3.

41. Sept. 9, '15. J.J. Pipe fitter. 23. L.E. Hurt Sept. 4. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Panoph's. Enuc'n. Steel in sclera. 8x2.

42. Sept. 12, '15. J.V. Scale man. 24. L.E. Hurt Sept. 9. Hammer. Scleral wound. Eye collapsed. Panoph's. Enuc'n. 3x1.

43. Oct. 11, '15. W.R. Mach't. 18. R.E. Hurt Aug. 10. Hammer. Cornea and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 27, Cat. Op'n. Nov. 24, V. Objects. 2x2.

44. Oct. 15, '15. J.J. Foreman. 32. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 11, lens clear. V. 20/30. ½x½.

45. Oct. 29, '15. W.T. Mach't. 22. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Oct. 31, eye soft and irritable. Iridocyclitis. Enuc'n. 6x3.

46. Nov. 19, '15. J.L. Lab'r. 29. L.E. Hammer. Eyeball collapsed. Sclerocorneal wound. X-R Pos. Enuc'n. 1x½.

47. Dec. 12, '15. W.K. Clerk. 34. L.E. Hurt Dec. 7. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Cat. Feb. 3, '16, V. L.P. 2x2.

48. Jan. 7, '16. J.O. Iron worker. 42. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 22, Iridocyclitis; soft eye; Enuc'n. 5x2.

49. Jan. 29, '16. E.G. Oiler. 22. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 2, V. 20/15. 1x1.

50. Feb. 4, '16. S.W. Boilermaker. 29. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Mch. 2, Cat. Op'n. May 14, Enuc'n. 4x2.

51. Feb. 11, '16. A.H. Engine Inspector. 32. L.E. Hurt Feb. 10. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 7, V. L.P. 4x2.

52. Mch. 7, '16. J.L. Saw-maker. 30. L.E. Flying steel. Cornea, iris and lens injured. Removed steel with forceps. Ant. R'te. Panoph's. Enuc'n. 5x2.

53. Mch. 13, '16. A.H. Cement worker. 41. R.E. Hurt Mch. 8. Working on a lathe. Piece of steel struck eye. Corneal wound. Can see steel in iris. Mag. Op'n. Ant. R'te. Successful. Dec. 15, '16, V. 20/20. 1x1.

54. Apr. 1, '16. H.S. Puncher. 39. R.E. Left eye blind. Hurt Dec. 16, '15. Hammer. Nothing done. X-R Pos. Cat. Mag. Op'n. Post R'te. Successful. Sept. 15, Cat. Op'n. Nov. 15, V. with glass 20/200. Jan. 3, '18, V. the same. 15x½.

55. June 6, '16. J.S. Trunkmaker. 27. R.E. Hammer. Corneal injury. Steel seen in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. June 17, V. 20/20. ½x½.

56. June 27. '16. W.E. Boilermaker. 39. L.E. Hurt May 13. Hammer. Corneal injury. Cat. Steel seen in lens. Cat. and steel removed. Ant. R'te. Aug. 11, V. with glass 20/30. 4x½.

57. Aug. 15, '16. J.J. Drop Hammer Operator. 30. R.E. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 6, V. L.P. 4x3.

58. Aug. 21, '16. J.A. Blacksmith. 35. R.E. Hammer. Scleral wound. Mag. Op'n, Post. R'te. Successful. Oct. 5, V. 20/200. 15x9.

59. Aug. 24, '16. J.H. Sheet Iron Worker. 40. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Sept. 13, Eye Soft, Irritable, Inflamed. Enuc'n. Steel stuck in sclera. 5x4.

60. Sept. 12, '16. G.B. Plumber. 23. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 8x6.

61. Oct. 11, '16. E.O. Carpenter. 24. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Nov. 17, V. 20/70. 1x1.

62. Nov. 8, '16. J.N. Lab'r. 31. L.E. Punch press accident. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 23, Cat. Op'n. Apr. 20, V. with glass 10/200. 4x1.

63. Jan. 2, '17. W.H. Lab'r. 24. R.E. Hurt Dec. 26. Drill press. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 20, V. 20/20. 1x1.

64. Jan. 12, '17. J.P. Blacksmith. 28. R.E. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Ant. R'te. Unsuccessful. Panoph's. Enuc'n. Steel stuck in sclera. 5x5.

65. Mch. 21, '17. J.N. Mach't. 45. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Apr. 12, Cat. Op'n. Mch. 18, '18, Eye soft. Iridocyclitis. Enuc'n. 8x1.

66. Mch. 28, '17. S.J. Lab'r. 30. L.E. Hurt Mch. 27. Cutting Dies. Cornea and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Apr. 12, Cat. Op'n. May 11, V. with glass 20/40. 2x½.

67. Apr. 2, '17. M.M. Stationary Engineer. 28. L.E. Hurt Apr. 1. Electric flash. Something flew in eye. Corneal wound. Steel seen in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. Oct. 5, '17, V. 20/30. 2x2.

68. Apr. 3, '17. F.B. Lab'r. 18. L.E. Hurt Apr. 2. Hammer. Cornea and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 1x2.

69. Apr. 6, '17. J.M. Lab'r. 48. R.E. Hurt one week ago. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Advised. Refused. Enuc'n. Steel in vitreous. 21x2.

70. Apr. 10, '17. H.T. Metal worker. 24. R.E. Hammer. Cornea, iris and lens injured. Can see steel in vitreous. Mag. Op'n. Ant. R'te. Successful. Panoph's. Enuc'n. 3x1.

71. Apr. 27, '17. G.C. Mach't. 22. R.E. Hurt Apr. 26. Hammer. Can see steel in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. Aug. 10, V. 20/20. 1x1.

72. May 2, '17. W.B. Lathe Operator. 45. R.E. Hurt two weeks ago. Steel from lathe passed thru cornea and into lens. Cat. X-R Pos. Steel in lens. Removed lens and steel. June 2, '24, V. L.P. ½x½.

73. May 9, '17. T.B. Lab'r. 35. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 25, V. 20/20. 1x1.

74 June 2, '17. F.C. Mach't. 27. L.E. Hurt May 31. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. July 15, Cat. Op'n. Jan. 2, '18, V. fingers. 3x1.

75. June 9, '17. G.R. Mach't. 21. R.E. Working Press Punch. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. July 27, V. 20/200. 6x½.

76. July 9, '17. N.G. Lab'r. 21. R.E. Hurt Apr. 21. Hammer. Rupture Sclerocorneal junction. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 12, eye quiet. V. L.P. 5x4.

77. July 25, '17. B.R. Lab'r. 24. L.E. Hurt July 23. Hammer. X-R Pos. Panoph's. Advised Enuc'n. Refused. Mag. Op'n. Post. R'te. Successful. Left my care. 3x3.

78. Aug. 24, '17. J.P. Mach't. 36. R.E. Hurt Aug. 18. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 16, V. 20/30. 1x1.

79. Aug. 25, '17. G.G. Automatic Hammer. 30. R.E. Hurt Aug. 23. Air Hammer. Scleral opening. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 3, '18, V. 20/20. 5x3.

80. Sept. 13, '17. S.K. Lab'r. 46. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 10, V. L.P. Vitreous hazy. Detached retina. 4x3.

81. Oct. 9, '17. E.B. Steel metal worker. 28. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 2, '18, V. 20/20. 8x3.

82. Nov. 5, '17. C.W. Iron worker. 31. R.E. Hurt Nov. 1. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 4x4.

83. Jan. 16, '18. P.B. Lab'r. 34. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Cat. Secondary glaucoma. Cat. Op'n., with Iridectomy. Enuc'n. 4x3.

84. Jan. 24, '18. J.W. Mach't. 21. R.E. Hammer. Cornea and iris wounded. X-R Pos. Mag. Op'n. Ant. R'te. Successful. May 24, V. 20/200. 1x1.

85. Feb. 20, '18. J.B. Lab'r. 22. R.E. Chipping. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 9x4.

86. Feb. 25, '18. G.B. Lab'r. 48. R.E. Hurt Feb. 22. Hammer. Cornea and iris injured. X-R Pos. Panoph's Enuc'n. 3x3.

87. Mch. 2, '18. A.G. Lab'r. 22. L.E. Hammer. Corneal wound. Steel in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. Mch. 28, V. 20/30. ½x½.

88. Mch. 4, '18. J.G. Mach't. 32. R.E. Hammer. Eyeball collapsed. Sclerocorneal wound. Enuc'n. 18x14.

89. Apr. 4, '18. M.P. Lab'r. 28. L.E. Hurt Mch. 14. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Panoph's. Enuc'n. 8x1.

90. Apr. 15, '18. J.C. Iron worker. 30. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. July 9, V. L.P. 5x3.

91. Apr. 29, '18. M.S. Lab'r. 28. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. July 7, '19, V. 20/100. 3x2 .

92. Apr. 30, '18. R.B. Mach't. 36. R.E. Hurt Aug. 19, '17. Hammer. Scleral scar. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 2, V. 20/15. 2x1.

93. May 31, '18. L.P. Lab'r. 34. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 29, Optic neuritis. Feb. 24, '19, V. 20/20. 2x1.

94. June 6, '18. O.W. Lab'r. 24. L.E. Hurt June 5. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 9x5.

95. June 8, '18. M.K. Lab'r. 25. L.E. Hurt June 6. Hammer. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 4x3.

96. June 9, '18. C.C. Lab'r. 19. R.E. Hurt June 2. File. Cornea, iris and lens injured. Panoph's. Enuc'n. 1x1.

97. June 18, '18. W.S. Lab'r. 18. L.E. Hurt June 13. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 18, '20, V. L.P. 5x4.

98. July 8, '18. S.G. Mach't. 35. L.E. Hurt two months ago. Hammer. Corneal scar. Iris and lens injured. X-R Neg. Steel seen in lens. Refused Op'n. Apr. 10, '19. Removed Cat. and steel. Iridocyclitis. Eye soft and irritable. Enuc'n. ½x½.

99. July 25, '18. J.G. Lab'r. 25. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Aug. 13, Cat. Op'n. July 16, '19, V. L.P. 3x2.

100. July 27, '18. W.S. Lab'r. 20. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 1x1.

101. Aug. 13, '18. J.T. Lab'r. 64. L.E. Hurt Aug. 12. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 24, '21, V. L.P. 7x2.

102. Aug. 19, '18. G.G. Lab'r. 25. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 10, '19, Detached retina. V. L.P. 3x3.

103. Aug. 21, '18. S.K. Lab'r. 30. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 11, V. 20/20. 2x1.

104. Oct. 2, '18. J.K. Lab'r. 25. R.E. Hurt Sept. 30. Reaming steel. Cornea, iris and lens injured. Hypopyon. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 20, Cat. Op'n. Nov. 30, V. with glass 20/20. 2x1.

105. Oct. 3, '18. A.K. Lab'r. 39. R.E. Hurt Oct. 2. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 25, Cat. Op'n. Apr. 2, '19, V. with glass 20/40. 1x1.

106. Oct. 14, '18. A.C. Lab'r. 40. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 4x2.

107. Oct. 18, '18. E.J. Electrician. 18. R.E. Hurt Oct. 5. Hammer. Scleral wound. X-R Pos. Mag Op'n. Post. R'te. Successful. Sept. 4, '19, V. 20/20. 5x1.

108. Oct. 19, '18. W.A. Mechanic. 25. R.E. Hurt Oct 18. Hammer. Scleral wound. X-R Neg. Also X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Nov. 13, V. 20/15. Advised to come occasionally for observation. Never came.

109. Oct. 31, '18. F.L. Lab'r. 18. L.E. Drill press accident. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Unsuccessful. Nov. 1, Cat. Op'n. Feb. 27, '19, V. with glass 20/40. X-R still Pos. Located in Post. Sclera.

110. Nov. 8, '18. L.S. Blacksmith. 40. R.E. Hurt Oct. 5. Hammer. Corneal wound. Cat. X-R Pos. Steel in lens. Removed lens and steel. Dec. 31, V. with glass 20/200. 3x3.

111. Dec. 24, '18. C.S. Mach't. 34. R.E. Hurt Dec. 12. Drill broke. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 15, '19, V. 20/20. 2x1.

112. Dec. 30, '18. R.D. Lab'r. 37. R.E. Hurt Dec. 23. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 2, '19, V. 20/20. 2x1.

113. Jan. 10, '19. J.J. Lab'r. 24. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 12, Dismissed from hospital to come to office. Never saw him again. ½x½.

114. Jan. 28, '19. J.M. Car repairer. 30. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 6, Cat. Op'n. Apr. 19, V. with glass 10/200. 4x3.

115. Jan. 30, '19. C.B. Mach't. 21. R.E. Hurt Jan. 29. Hammer. Steel in Ant. Capsule. Mag. Op'n. Ant. R'te. Successful. June 1, '19, V. 20/20. 1x1.

116. Feb. 3, '19. J.T. Lab'r. 24. L.E. Hurt Feb. 2. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 1, V. 20/50. 3x2.

117. Feb. 17, '19. Miss F.P. Shop worker. 28. R.E. Hurt Feb. 15. Hammer . Scleral wound. Cat. Hypopyon. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Washed out Ant. Chamber. Mch. 14, Swollen lens and iris. Cat. and Iridectomy Op'n. Apr. 17, Panoph's. Enuc'n. 3x1.

118. Feb. 19, '19. V.P. Lab'r. 42. L.E. Hurt Nov. 8. Hammer. X-R Neg. (by some one else) X-R Pos. (by another man) Mag. Op'n. Post. R'te. Successful. Mch. 4, Eye quiet. V. L.P. 2x2.

119. Mch. 12, '19. J.Z. Lab'r. 45. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 3, V. 20/30. 8x5.

120. Mch. 15, '19. E.J. Lab'r. 24. R.E. Hurt Mch. 13. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 10, V. 20/30. 2x2.

121. Mch. 6, '19. W.B. Lab'r. 28. L.E. Hammer Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 1, V. 20/20. 1x½.

122. Mch. 22, '19. F.G. Lab'r. 24. R.E. Hurt Mch. 21. Hammer. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. Apr. 11, V. 20/20. ½x½.

123. Apr. 8, '19. J.J. Carpenter. 24. R.E. Hurt Apr. 2. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 1, V. 20/20. 1x1.

124. May 1, '19. A.M. Carpenter. 27. L.E. Hammer. Collapsed eye. Sclerocorneal wound. X-R Pos. Enuc'n. 4x5.

125. May 4, '19. J.S. Carpenter. 22. R.E. Hurt May 3. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 9, V. 20/20. 2x1.

126. Aug. 2, '19. E.P. Lab'r. 22. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. Sept. 27, '21, V. 20/20. 1x1.

127. Aug. 6, '19. L.P. Lab'r. 22. R.E. Hurt two months ago. Hammer. Corneal scar. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Panoph's. Enuc'n. Steel stuck in vitreous. 9x½.

128. Aug. 8, '19. E.M. Lab'r. 30. R.E. Hurt Aug. 6. Hammer. Scleral wound. Cat. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 8, V. L.P. 13x5.

129. Aug. 16, '19. G.D. Lab'r. 20. L.E. Hurt two weeks ago. Hammer. Scleral scar. X-R Pos. Mag. Op'n. Post. R'te. Successful Sept. 17, V. Hand movements. 4x3.

130. Aug. 27, '19. J.N. Lab'r. 31. R.E. Hammer. Eye collapsed. Sclerocorneal wound. X-R Pos. Enuc'n. 15x8.

131. Sept. 12, '19. W.S. Lab'r. 24. R.E. Hurt 6 months ago. Hammer. Scleral scar. X-R Pos. and Neg. Mag. Op'n. Post. R'te. Unsuccessful. Eye soft and irritable. Iridocyclitis. Enuc'n. Steel thickly covered with exudate in vitreous. Bands of adhesions between steel and walls of eyeball. 2x2.

132. Oct. 16, '19. J.J. Lab'r. 22. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. Nov. 22, V. 20/20. 2x2.

133. Oct. 17, '19. W. S. Metal worker. 32. R.E. Hurt Mch. 7. Hammer. Scleral scar. Cloudy vitreous X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 25, V. L.P. 2x1.

134. Oct. 20, '19. A.W. Lab'r. 27. L.E. Hurt Oct. 17. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 2x1.

135. Oct. 27, '19. W.G. Lab'r. 33. L.E Hurt Oct. 25. Hammer. X-R Pos. Refused Mag. Op'n. Oct. 30, Mag. Op'n. Post. R'te Successful. May 1, '20, V. L.P. 5x2.

136. Oct. 28, '19. F.K. Lab'r. 19. L.E Hurt Oct. 27. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Panoph's. Enuc'n. Steel in vitreous. 4x4.

137. Nov. 1, '19. T.S. Lab'r. 33. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 4x2.

138. Nov. 6, '19. M.L. Lab'r. 40. L.E. Hurt Nov. 4. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 28, V. 20/30. 2x1.

139. Nov. 7, '19. C.O. Lab'r. 15. R.E. Hurt Oct 30. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 20, '20, V. L.P. 3x1.

140. Nov. 10, '19. J.H. Lab'r. 27. L.E. Hurt Sept. 1. Working at bench; struck by foreign body. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 18, Cat. Op'n. May 2, '20, V. with glass 20/50. 1x1.

141. Dec. 28, '19. T.H. Printer. 18. R.E. Turning lathe. Foreign body hit eye. Corneal wound. Foreign body in Ant. Chamber. Mag. Op'n. Ant. R'te. Unsuccessful. Removed by fine, smooth forceps. Jan. 8, '20, V. 20/20. 2x1.

142. Jan. 2, '20. J.V. Die setter. 24. R.E. Working punch. Steel hit eye. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Panoph's. Enuc'n. 3x1.

143. Jan. 10, '20. S.B. Lab'r. 18. L.E. Chipping steel. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 16, Cat. Op'n. Aug. 5, V with glass 20/30. 5x3.

144. Jan. 17, '20. B.N. Lab'r. 25. L.E. Hurt Jan. 15. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 10, V. L.P. Detached retina. 4x1.

145. Jan. 23, '20. L.H. Lab'r. 22. L.E. Hurt Jan. 22. Punch press. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 9x1.

146. Jan. 24, '20. P.C. Lab'r. 24. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. July 17, V. 20/20. 5x3.

147. Feb. 11, '20. D.A. Moulder. 16. L.E. Hot steel splashed in eye. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 10x5.

148. Feb. 21, '20. J.N. Lab'r. 39. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. Mch. 25, V. L.P. 4x2.

149. Apr. 9, '20. F.O. Lab'r. 22. L.E. Hurt Apr. 8. Hammer. Corneal wound. Steel in iris. X-R Pos. Mag. Op'n. Ant. R'te. Sept. 1, V. 20/50. 4x1.

150. Apr. 12, '20. J.V. Lab'r. 19. R.E. Hammer. Collapse of globe. Sclerocorneal wound. Enuc'n. 4x1.

151. Apr. 16, '20. A.K. Lab'r. 20. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Iridocyclitis. Enuc'n. 5x3.

152. May 4, '20. W.S. Lab'r. 20. L.E. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 5x3.

153. June 2, '20. G.G. General agent. 51. R.E. Hurt June 1. Hammer. Cornea, iris and lens injured. X-R Pos. (Localized in vitreous). Mag. Op'n. Post. R'te. Unsuccessful. Panoph's. Enuc'n. Steel found in socket. 5x3.

154. July 10, '20. M.P. Lab'r. 40. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 24, '24, V. 20/20. 3x1.

155. July 17, '20. L.F. Warehouse man. 25. L.E. Hurt July 13th. Using punch. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 31, '21, V. L.P. 2x1.

156. July 26, '20. I.M. Janitor. 50. L.E. Hurt July 24. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 3x1.

157. July 27, '20. W.S. Lab'r. 23. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 3, V. L.P. 3x2.

158. Aug. 4, '20. J.C. Lab'r. 63. L.E. Hurt July 26. Hammer. Corneal scar. Hypopyon. Cat. X-R Pos. Mag. Op'n. Post. R'te. Successful. Aug. 17, Hypopyon absorbed. Sept. 3, Cat. Op'n. Dec. 3, V. with glass 20/50. 2x1.

159. Aug. 6, '20. F.G. Lab'r. 25. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 1, V. 20/20. 2x1.

160. Sept. 4, '20. L.N. Lab'r. 40. L.E. Hurt Jan. 4. Hammer. Scleral scar. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 22, V. 20/20. 3x1.

161. Oct. 19, '20. B.C. Lab'r. 25. L.E. Hurt Oct. 18. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 1x1.

162. Nov. 10, '20. T.F. Lab'r. 24. R.E. Hurt Nov. 9. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 10x5.

163. Nov. 13, '20. M.K. Lab'r. 24. R.E. Hurt Nov. 12. Using reaming machine. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 3, '21, V. 20/20. 2x½.

164. Nov. 22, '20. C.L. Lab'r. 28. L.E. Hammer. Scleral wound. X-R Pos. (Localization showed foreign body in socket.) Let it alone. Feb. 7, '21. V. L.P. 15x8.

165. Dec. 10, '20. J.M. Lab'r. L.E. Hurt Dec. 7. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 7, '22. Cat. V. L.P. 5x4.

166. Dec. 21, '20. J.W. Lab'r. 17. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 2, '22. Cat. Eye quiet. V. Absolute blindness. 3x1.

167. Jan. 5, '21. H.L. Lab'r. 45. R.E. Hurt Jan. 4. Hammer. Cornea and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 1, Cat. Op'n. Aug. 29, V. L.P. 3x2.

168. Feb. 1, '21. W.L. Metal worker. 28. R.E. Hurt Nov. 1920. Hammer. Cornea, iris and lens injured. X-R Neg. June 7, Cat. Op'n. Steel found in lens. June 24, V. with glass 20/30. 1½x1.

169. Apr. 12, '21. J.C. Mach't. 42. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Apr. 18, Panoph's. Enuc'n. 4x3.

170. July 11, '21. A.R. Mach't. 27. R.E. Chipping steel. Steel deeply in cornea. Efforts at removal pushed it into Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. Aug. 23, V. 20/20. ½x½.

171. Aug. 5, '21. Mrs. N.L. Coil winder. 27. R.E. Hurt July 20. Winding fine copper wire. Wire broke. Struck eye. Wire seen in iris. Corneal opening. Wire removed by fine, smooth forceps. Aug. 29, V. 20/20. 3x¼.

172. Sept. 15, '21. L.D. Track walker. 19. R.E. Hammer. Corneal wound. Steel seen in Ant. Chamber. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Nov. 15, Eye soft; Irritable; Blind. Iridocyclitis. Enuc'n. 10x5.

173. Oct. 5, '21. S.F. Blacksmith. 38. L.E. Bending steel. Piece flew in eye. Sclerocorneal wound. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Panoph's. Enuc'n. 5x3.

174. Dec. 13, '21. F.S. Bench hand. 34. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Apr. 5, '22. V. L.P. 5x2.

175. Dec. 22, '21. L.M. Punch press operator. 40. L.E. Hurt Dec. 20. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 3, V. 20/20. R. eye blind for years.

176. Feb. 25, '22. F.B. Mach't. 18. L.E. Hammer. Corneal wound. Steel in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. June 1, V. 20/20. 1x1.

177. Feb. 27, '22. M.F. Car repairer. 36. R.E. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Apr. 3, Cat. Op'n. June 1, V. with glass 20/40. 3x2.

178. Aug. 8, '22. F.E. Punch press operator. 30. L.E. Hurt Aug. 7, operating punch press. Sclerocorneal wound. Mag. Op'n. Post. R'te. Successful. Cat. Nov. 1, V. L.P. 6x3.

179. Aug. 10, '22. C.M. Sales manager. 28. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 10, V. 20/30. 3x2.

180. Aug. 16, '22. A.C. Riveter. 27. R.E. Riveting. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Apr. 3, '24. Partially absorbed cataract. V. Fingers at six feet. 3x1.

181. Sept. 15, '22. L.H. Tap fitter. 24. R.E. Hurt Sept. 13. Ran into swing window. Corneal wound. Hemorrhage in Ant. Chamber. Sept. 18, can see foreign body in iris. X-R Neg. Sept. 20, Removed portion of iris containing steel. Jan. 29, V. 20/50. ½x½.

182. Oct. 5, '22. J.F. Steel worker. 57. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 2, '23, V. L.P. 4x1.

183. Oct. 11, '22. E.K. Mach't. 25. L.E. Hurt Oct. 10. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 28, V. 20/20. 1x1.

184. Oct. 13, '22. C.K. Lab'r. 28. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 8x7.

185. Oct. 27, '22. C.G. Iron worker. 33. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. Jan. 3, '23. V. 20/20. ¾x¾.

186. Nov. 1, '22. A.K. Carpenter. 28. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Nov. 25, V. 10/200. 1x1.

187. Nov. 17, '22. G.K. Blacksmith. 29. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Panoph's. Enuc'n. 4x2.

188. Dec. 14, '22. J.A. Lab'r. 48. R.E. Hurt Nov. 27, cutting a cable. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te Successful. Panoph's. Enuc'n. 8x1. (wire)

189. Dec. 26, '22. J.K. Blacksmith. 32. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. May 2, '23, V. 20/40. 5x3.

190. Jan. 10, '23. J.F. Mach't. 36. R.E. Hammer. X-R Neg. Also X-R Pos. Mag. Op'n. Post. R'te. Successful. May 8, Cat. V. L.P. 2x1.

191. Jan. 17, '23. J.B. Millwright. 40. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Aug. 24, Cat. V. L.P. 5x1.

192. Jan. 26, '23. J.M. Bucker. 37. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Mch. 26, V. 20/30. 3x3.

193. Jan. 26, '23. A.P. Lab'r. 49. R.E. Hammer. Foreign body in Ant. Chamber. Corneal wound. Removed by opening cornea and picking it out with small, smooth forceps. (Nonmagnetic.) Mch. 5, V. 20/30. ½x½.

194. Feb. 15, '23. A.H. Drop hammer operator. 34. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Panoph's. Eunc'n. 5x2½.

195. Apr. 4, '23. L.K. Feeder. 44. R.E. Hurt Apr. 2. Hammer. Sclerocorneal wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Iridocyclitis. Eye soft; Irritable; Blind. Enuc'n. 3x3.

196. Apr. 17, '23. H.M. Boilermaker. 26. L.E. Hurt Apr. 15. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Iridocyclitis. Eye soft. Enuc'n. 1x1.

197. Apr. 4, '23. J.M. Electrician. 29. L.E. Hammer. Corneal wound. Steel in Ant Cham. Mag. Op'n. R'te. Successful. Apr. 16, V. 20/20. ½x½.

198. Apr. 15, '23. A.F. Inside finisher. 23 L.E. Hurt Apr. 12. Hammer. Corneal wound. Cat. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 1, V. L.P. 2x1.

199. May 4, '23. A.B. Mach't. 24. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post R'te. Successful. June 3, V. 20/20. ½x½.

200. May 15, '23. G.P. Inspector, 34. R.E. Hammer. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. Feb. 12, '24, Cat. V. L.P. 1x½.

201. May 21, '23. E.I. Carpenter. 49. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. June 28, V. 20/200. 4x3.

202. June 8, '23. G.D. Clerical. 21. L.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Jan. 3, '24, V. 20/20. 2x1.

203. June 8, '23. S.M. Lab'r. 30. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 20, V. 20/20. 2x1.

204. Aug. 27, '23. A.B. Mach't. 37. L.E. Hurt Aug. 24. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Dec. 1, '23, V. 20/20. ½x½.

205. Oct. 30, '23. C.K. Mach't. 36. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Unsuccessful. Iridocyclitis. Soft, irritable eye. Enuc'n. Steel, in scleral wall. 5x3.

206. Nov. 8, '23. E.T. Construction. 40. R.E. Hurt Nov. 7. Hammer. Corneal wound. Can see steel in iris. Mag. Op'n. Ant. R'te. Successful. Feb. 1, '24, V. 20/20. 2x1.

207. Dec. 6, '23. S.D. Burnisher. 34. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 14, '24, Cat. V. L.P. 3x1.

208. Dec. 14, '23. Miss M.L. Coil winder. 17. R.E. End of wire struck eye. Corneal wound. Copper wire seen in iris. Removed wire with corneal incision and fine, smooth forceps. Feb. 8, '24, V. 20/20. 2x¼.

209. Jan. 22, '24. C.N. Auto Repairer. 35. R.E. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Feb. 1, V. 20/30. 1x1.

210. Jan. 24, '24. P.V. Pipe fitter. 39. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Much lens matter escaped, and iris prolapsed and was amputated. Apr. 19, V. L. P. 3x2.

211. Jan. 24, '24. F.M. Riveter. 29. L.E. Hurt Oct. 29, '23. Hammer. Corneal wound. Cataract. X-R Pos. Steel in lens. Cat. Op'n. Lens extracted and with it a small dot of nonmagnetizable steel. So small it was lost on a pledget of cotton. A few days later X-R Neg. Oct. 2, Eye quiet. I saw a suspicious looking object in Ant. Chamber. Used magnet. This object did not respond, but a following of the iris occurred, appearing as if something was trying to escape. I opened cornea, drew a piece of steel, located just back of iris, into pupillary area and then down to bottom of Ant. Chamber, where I extracted it by Mag. Nov. 1, '24, V. with

glass 20/30. 1x1. The two pieces of steel, instead of one, and the unreliability of the X-R reports are interesting.

212. Feb. 20, '24. E.W. Mach't. 21. L.E. Foreign body from lathe struck eye. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Removed piece 1x1. It did not look large enough for the X-R picture. Another X-R taken. It was pos. Another Mag. Op'n. Post. R'te. was made. Another piece of steel was removed 2x1. Panoph's. Enuc'n.

213. Feb. 21, '24. F.C. Blacksmith. 35. R.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te Successful. Panoph's. Enuc'n. 2x1.

214. Mch. 19, '24. J.H. Mach't. 36. R.E. Hurt Mch. 16. Hammer. X-R Post. Mag. Op'n. Post R'te. Successful. Apr. 6, V. 20/30. 3x1.

215. Mch. 31, '24. E.H. Mechanic. 27. L.E. Hurt Mch. 29. Hammer. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. Sept. 15, V. 20/20. 2x1.

216. Apr. 2, '24. C.S. Drill press. 25. L.E. Hurt Apr. 1. Hammer. Corneal wound. Steel in iris. Mag. Op'n. Ant. R'te. Successful. Apr. 15, V. 20/20. ½x½.

217. Apr. 30, '24. F.M. Mach't. 23. R.E. Hurt Aug. 26. Hammer. Corneal wound. Steel in Ant. Chamber. Mag. Op'n. Ant. R'te. Successful. July 14, '24, V. 20/30. 1x½.

218. June 28, '24. H.G. Punch press. 56. L.E. Hurt June 27. Steel flew from punch press. X-R Pos. Cornea, iris and lens injured. Mag. Op'n. Ant. R'te. Successful. Sept. 15, Cat. and Iridectomy Op'n. Soft eye. Irritable. Iridocyclitis. Enuc'n. 4x1.

219. July 3, '24. T.G. Stove builder. 35. L.E. Hurt Jan. 18. Hammer. Scleral scar. Panoph's. Enuc'n. 4x1.

220. July 3, '24. Lab'r. 23. L.E. Got concrete in eye. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Ant. R'te. Successful. Later Cat. Op'n. Oct. 29, Eye quiet. V. L.P. 2x1.

221. Aug. 28, '24. J.L. Lab'r. 30. L.E. Hurt Aug. 27. Hammer. Scleral wound. X-R Pos. Mag. Op'n. Post. R'te. Successful. Sept. 27, V. L.P. 2x2.

222. Aug. 29, '24. W.V. Mill worker. 20. L.E. Hammer. X-R Pos. Cornea, iris and lens injured. Mag. Op'n. Post. R'te. Successful. Panoph's Enuc'n. 8x4.

223. Sept. 20, '24. A.P. Battery worker. 52. L.E. Hammer. Cornea, iris and lens injured. X-R Pos. Mag. Op'n. Post. R'te. Successful. Oct. 13, V. 20/30. Lens clear except at one small point. 2x1.

The following occupations I find in this list of 223 cases.

Automatic Hammer Operator	1
Automobile Repairer	1
Battery Worker	1
Bench Hand	1
Blacksmiths	7
Boilermakers	8
Bucker	1
Burnisher	1
Carpenters	7
Car Repairers	3
Cement Worker	1
Clerks	2
Coil Winders	2
Construction	1
Die Worker	1
Die Setter	1
Drill Press Operator	1
Drop Hammer Operator	2
Electricians	2
Feeder	1
Flue Setter	1
Foreman	1
General Agent	1
Handy Man	1
House Wrecker	1
Inside Finisher	1
Inspectors	2
Iron Workers	5
Janitor	1
Laborers	88
Lathe Operator	1
Machinists	33
Mechanics	4
Metal Workers	3
Millwrights	2
Moulder	1
Oiler	1
Pipe Fitters	2
Plumber	1
Printer	1
Puncher	1
Punch Press Operators	3
Riveters	2
Sales Manager	1
Saw Maker	1
Scale Man	1
Section Hand	1
Sheet Iron Worker	1
Shop Worker	1
Stationary Engineer	1
Steam Fitter	1
Steel Workers	3
Stove Builder	1
Strippers	2
Tank Shop	1
Tap Fitter	1
Tool Shop Worker	1
Track Walker	1
Trunk Maker	1
Warehouse Man	1
Wire Binder	1

There were 109 Left Eyes injured, and 114 Right Eyes injured.

Causes of injury are as follows:

Cutting Cable	1
Drop Hammer	1
Fitting Tap	1
Flying Copper while Winding Copper Wire	2
Flying Steel from an Air Hammer	1
Flying Steel from Chipping	3
Flying Steel from Cutting Dies	1
Flying Steel from a Drill Press	3
Flying Steel from an Electric Flash	1
Flying Steel from a Lathe	4
Flying Steel from a Punch Press	7
Flying Steel from a Saw	1
Flying Steel when Working at Bench	1
Flying Steel while Bending Steel	1
Flying Steel while Filing	1
Flying Steel while Moulding	1
Flying Steel while Reaming Steel	2
Hammer	189
Mixture of Concrete and Steel	1
Riveting	1

Probably a number of these accidents that are not classified under "Hammering" should come under this heading, such as a man who gets hurt cutting dies, or one who gets hurt while reaming steel, etc. Both of these accidents were probably "hammering" accidents, but of course notes are not always taken carefully, and after several years have elapsed I have to depend entirely upon these notes, and I therefore give them as they occur.

Location of Injury:	
Anterior—Wound thru Cornea	112
Posterior—Wound thru Sclera	90
Sclerocorneal—Wound at Sclero-Corneal Junction	21
Magnet Operation Route:	
Posterior	155
Anterior	47
Result of Magnet Operations:	
Successful	184
Unsuccessful	16

A curious coincidence occurs in cases Nos. 171 and 208. These are both women. They were both winders of copper wire. At the time the accident occurred, they were both winding fine copper wire on a spool. In both cases, the wire broke, penetrating the cornea, was lodged in the iris, was removed by a corneal incision and fine, smooth forceps, without prolapse of iris. In both cases, a vision of 20/20 was the result.

There were 72 enucleations. It will be observed that a vast majority of these cases, where enucleation was necessary, were hopelessly lost from the start.

Other deductions may be drawn by the reader by a perusal of the recitals of the various cases.

7 West Madison Street

NOTES, CASES, INSTRUMENTS

TRANSIENT RING OPACITY OF CORNEA.

HARRY S. GRADLE, M.D.

CHICAGO.

During the past three years, I have examined more than twenty-five cases of an unusual condition in the cornea that I have never seen described in the literature. It appears to be independent of age, sex, or ocular pathology, never causes symptoms noticeable by the patient, and disappears spontaneously within one to three days.

With the naked eye, a small white ring can be seen in the cornea. It appears as tho the cornea had been stamped with a hot circular branding iron, causing a pure white circular opacity without any disturbance of the epithelium. The ring is usually less than one millimeter in diameter and the band is but a narrow line. There are no accompanying or secondary manifestations.

When viewed with the corneal microscope using 45 diameters magnification, under focal illumination with the Pointolite Slit Lamp, the ring appears to lie in the deeper cells of the corneal epithelium, involving Bowman's membrane and possibly the anterior corneal stroma. It is composed of innumerable discrete and coalescent dead white punctate areas that seem to be composed of inorganic salts. The

component dots do not lie in a uniform antero-posterior axis, but slope slightly toward each other posteriorly, forming a truncated funnel, or else away from each other posteriorly, giving the outlines of a truncated cone. Invariably, that portion of the cornea that lies within the confines of the ring is clear and seems to be perfectly normal. The surrounding corneal tissue shows no abnormalities.

The lack of sensation is undoubtedly due to the unbroken epithelium, which eliminates the possibility of its being an aftermath of a foreign body. There was no regularity of distribution in the various cases except that it favored the central areas of the cornea rather than the limbus region. Never was the ring found to be nearer the limbus than some two millimeters. The abnormality was usually discovered accidentally during the course of a refraction; and after the first dozen cases showed that it was without clinical import, it was viewed with tolerant interest rather than alarm. The presence of the opacity in the pupillary area of the cornea, even on the visual axis, caused no interference with vision that could be detected with the ordinary methods at our command.

SUCTION INSTRUMENT FOR EXTRACTION OF CATARACT.

F. W. Dean, M. D., F. A. C. S.

COUNCIL BLUFFS, IOWA.

I was much interested in the article by Dr. Roderic O'Connor in the American Journal of Ophthalmology, Vol. 8, No. 1, "Discission of the Lens After the Twenty-fifth Year."

While in London in 1893, I picked up an instrument which I use for sucking out softened lens following discission, or fragments of lens substance left during extraction. I have used the instrument many times during the thirty years and much prefer its use to washing out the anterior and posterior chambers. The instrument, however, has a metal tip cemented on a glass barrel and is hard to clean. Recently, V. Mueller of Chicago has made for me an instrument with a silver barrel which can be easily cleaned and boiled. The instrument has not been changed except to help sterilization as otherwise it has been perfectly satisfactory. The accompanying photograph, three-quarters size, illustrates the instrument so clearly that a description does not seem necessary.

The operation is simple. The glass mouth piece is held between the teeth and the lips. The tip of the instrument is passed thru a small opening at the limbus of the cornea. The opening in the tip is brought under and in contact with the lens substance to be removed. A slight movement of the tongue draws the lens fragment into the barrel. The tip is moved from one particle of lens substance to another until all has been removed. This is done with one introduction of the tip. The operation is so simple and satisfactory that I prefer to remove the lens substance on the third or fourth day following the discission rather than wait for the lens to be absorbed. It

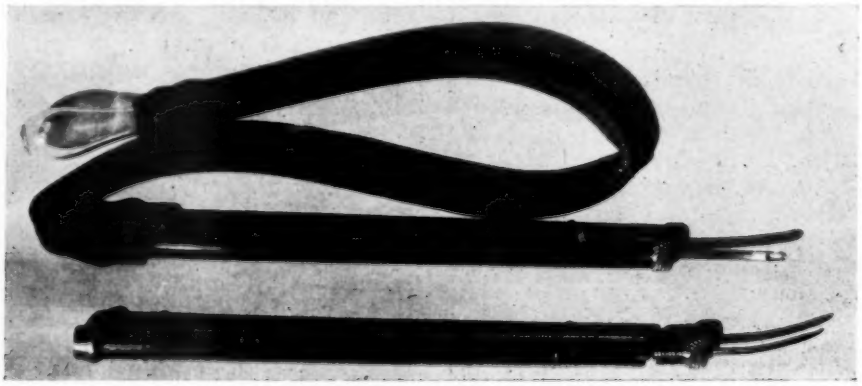

Fig. 1.—Suction instrument for extraction of softened lens matter.

should be borne in mind that if one desires to draw out the lens early he must incise it thoroly in order to give the aqueous free contact with the lens tissues.

Dr. O'Connor does a Curran operation to forestall a glaucoma which might occur from a swelling of the lens, another condition which not infrequently occurs in an eye irritated from a solution of the lens tissue in the aqueous. In either case the lens may be removed and the operation as described is easier than a Curran iridotomy.

Clinic Building.

DOUBLE OPTIC ATROPHY SECONDARY TO BRAIN TUMOR.

GEORGE F. LIBBY, M.D.

DENVER, COLORADO.

A man of forty-seven presented himself for examination on Dec. 6, 1924, stating that the vision of the right eye had steadily failed since 1905, and the left had gradually become impaired during the previous year. R. V.=5/20, L. V.=5/7.5 mostly, with correction. Both optic nerves showed white atrophy, the right being more pronounced; and the retinal vessels were narrowed, with the arteries indistinct. The fields of vision were greatly contracted. The patient's appearance was that of good health; but mental peculiarities observed were in accord with his reputation for being eccentric, tho a good and reliable worker.

Dr. E. C. Hill found the colloidal gold test and the Wassermann reaction negative as to the spinal fluid, and the Noguchi-Wassermann test negative for the blood. As the patient was about to have radiographs of the teeth, paranasal sinuses and brain, he fell on the steps of his home on Dec. 15th. Vomiting and prostration followed. He rested in bed three days, and went down town by himself. He seemed a little excited and anxious, but was gentle and reasonable. The following day he suddenly became unconscious, and remained so until his death occurred about ten hours later. Autopsy was refused by the family of the deceased. Dr. H. T. Pershing, who attended the patient in his last hours, expressed the opinion that death was due to tumor of the brain, probably glioma.

As brain tumor is a well known cause of optic atrophy, this fact should have been considered by the ophthalmologists who had fitted his glasses for many years. The atrophy was recognized, but syphilis was the only causative factor mentioned to the patient.

The only history of traumatism elicited was that in boyhood the pastime of head-knocking was violently practiced with other boys. Running toward each other, they would crack their skulls together with forcible impact.

The very slow and gradual development of the cerebral neoplasm and consequent atrophy of the optic nerve, and the adjustment to these handicaps, that enabled this patient to continue his work as a telegrapher up to five days before his death, are points worthy of note.

CONGENITAL ANOPHTHALMUS.

H. L. HILGARTNER, M.D.

AUSTIN, TEXAS.

L. M., aged six years, a pupil at the State Institution for the Blind, Austin, Texas, is mentally and physically normal in every respect (e. g., no webbed fingers or toes), except for the total absence of eyeballs. There are the usual small lids and small palpebral fissures. We were unable to get any history of the same or other malformation in antecedents. We can do no more than report another appearance of this rare occurrence.

RED TORIC LENS WITH HANDLE FOR STUDYING DIPLOPIA.

CONRAD BERENS, M.D., F.A.C.S.

NEW YORK CITY.

The diplopia disk to be described was made as the result of two experiences. It was found that patients with nervous diseases, and elderly people, could not hold a small red glass steadily before their eyes, and that the red lens placed in the trial frame did not permit a sufficiently wide field of binocular fixation.

It was found that diplopia resulted from the prismatic effect obtained from the edge of the pressed glass in diplopia spectacles.

This apparatus consists of a plane, monochromatic, red, toric, ground lens

Fig. 1.—Lens with handle for studying diplopia.

with a nine diopter base curve, mounted in a metal rim and supplied with a ring-tipped hexagonal handle. The curve of the lens permits its use over the patient's lenses.

It is employed in detecting diplopia and mapping out diplopia fields and in conjunction with the tangent screen in the extinction test for mapping scotomata and the blind spot. The glass is held before the eye not under examination, both eyes fixing the point of fixation and a colored test object, usually blue, is moved in the blind spot or the area of the suspected scotoma.

I am indebted to Mr. H. G. Herold of E. B. Meyrowitz & Co. for obtaining the toric monochromatic lens, and for supervising the making of the instrument.

30 East 40th Street.

SOCIETY PROCEEDINGS

ST. LOUIS OPHTHALMIC SOCIETY.

JANUARY 23, 1925.

DR. E. H. HIGBEE, PRESIDING.

Unilateral Nystagmus.

DR. LAWRENCE POST read this paper to be published in full in this journal.

Thermophore Treatment of Ring Ulcer of the Cornea.

DR. L. T. POST defined ring ulcer as that condition which is characterized by ulceration of the cornea beginning about 1 mm. from the limbus and gradually extending around the cornea, until a complete or almost complete circle is formed. The width of this circle varies, but averages about 2 mm. with extensions toward the center of the cornea. In certain cases, ulcers occur at several points in the periphery and by coalescence, a complete ring is formed. Unless the process is stopped the center of the cornea is invaded or, at some point, the ulcer perforates and a prolapse of the iris occurs with subsequent development of staphyloma.

A review of six cases of this disease revealed a striking similarity. In each case the age was between 34 and 45. The onset was insidious, without known cause. In all but one case, both eyes were involved. Cultures and smears were negative for organisms in four cases; in one case staphylococus was found in the conjunctival secretion; in one case no cultures were made. Of the ten eyes affected, (not including the case reported) perforation occurred in six. The visual result in these eyes in which perforation occurred, varied from 0 to 1/192. The final vision in the eyes which did not perforate was 20/75 in two cases and 20/38 in two cases.

In four of these cases no search for a focus of general infection was made, as they occurred before stress was laid upon such a possibility. In the only one in which efforts were made, not including the one herein recorded, the results were negative.

The treatment included abrasion of the palpebral conjunctiva to supply nutrition to the cornea, paracentesis, cauterization, the usual antiseptics and systemic treatments, including the injection of foreign proteins, etc. It was because of such discouraging visual results that a new method of treatment was tried in the case herewith reported.

A. C. S., age 34 years, was first seen August 17, 1924. The right eye was normal. The left eye had been operated on four years previously for removal of pterygium. In the middle of July, 1924, the left eye became sore without known cause. It was treated daily with atropin and antiseptics by a local ophthalmologist, without improvement. The ulcer continued to spread and the doctor advised the patient to seek aid elsewhere.

Examination: Vision O.S. 20/96. An ulcer 1½ mm. wide and averaging 1 mm. from the limbus encircled three-fourths of the cornea. The center of the cornea was not ulcerated. The ulcer was light gray, extending deeply into the substan-

tia propria. One-half of the inner periphery was a gray slough undermining the clear cornea at the center. Smears and cultures on blood agar were negative.

At the first visit, the whole of the ulcer was heated with the thermophore for one minute at 158°. This required four applications at different points. Holocain 1% was prescribed for use every hour. The patient passed a comfortable night, so the holocain was used only twice. The ulcer looked better in the morning. The following night the eye was extremely painful and the ulcer appeared to be extending at the upper temporal end. Treatment with silver nitrate in ½% solution and mercurochrome in 2% solution was given at the office. A rhinologist, Dr. Costen, reported that there was no outspoken nasal disease. He cocainized the sphenopalatine ganglion giving quick relief from the ocular pain which was, at that time very severe. Dental X-rays revealed one bad tooth. Next day the eye was better and it was decided to refrain from further thermophore application temporarily.

The diseased tooth was extracted five days after the first visit, but for two days previous to this the eye had shown improvement. The eye continued to improve and twelve days after the first visit the ulcer no longer stained with fluorescein; and in the following month the corneal infiltration gradually decreased. Two months later the vision in this eye was 20/24, without correction, and except for a gray scar at the site of the former ulceration there was no abnormality of the eye.

The apparent increase of the ulceration on the second day after the thermophore application may have been an exacerbation of the disease process, or may have been in the nature of a reaction. It was deemed, at that time, advisable to wait twenty-four hours before reapplying the thermophore as a similar apparent increase of ulceration has been noted in other cases after applying the thermophore.

Discussion. Dr. W. E. Shahan said that he had the pleasure of seeing the case reported by Dr. Post: the result was undoubtedly gratifying.

He had seen two other cases in the earlier days of the thermophore, one in consultation with Dr. Henderson, and another in consultation with another ophthalmologist. The case of Dr. Henderson's made a good recovery. The other case recovered after a change of physicians, the recovery being apparently affected by the use of boric acid solutions alone.

At that time he had no great enthusiasm about using the thermophore in ring ulceration, because of the absence of any known bacteriologic etiology. Clinical results, however, have established that this treatment is followed by a reaction that results in cure, and he should certainly resort to it if any such case should come into his hands.

Dr. John Green, Jr., stated that he had recently had under observation a patient with ring ulcer, that began soon after some embalming fluid splashed in the eye. The patient had received a month's treatment by another ophthalmologist without improvement. The ulcer was one mm. from the limbus and extended from 4 to 9 o'clock. Treatment consisted of atropin, dry heat, topical applications of tr. of iodin, mercurochrome, and two parenteral milk injections—all to no avail. The ulcerated area was thoroly curetted and a large conjunctival flap was drawn up to completely cover the curetted area. When the flap retracted at the end of ten days it was found that the ulcer had healed completely. There was no recurrence.

Paresis of Accommodation Following Toxin-Antitoxin.

Dr. Lawrence Post reported this case. Paresis of accommodation following diphtheria is not at all uncommon and has been attributed to the diphtheria toxin. Following the introduction of the sensitization (Schick) test for diphtheria, a toxin-antitoxin serum has been developed; which has been rather extensively used in those children who have given a positive Schick test. Toxin-antitoxin consists of toxin prepared from bacterial filtrates, but almost completely neutralized by standard diphtheria antitoxin. In the following case accommodative phenomena resulted from the administration of toxin-antitoxin known as one-tenth L plus.

J. F., 10 year old, had never had trouble with the eyes until the past two weeks during which time had been able to read only large print and that with

great difficulty. Vision with either eye was 20/24, but only 5 point type could be made out, and that very slowly. There was a low grade error of refraction entirely insufficient to account for the poor reading vision. Questioning elicited the information that the patient had had a positive Schick test about a month previously. Following this, three injections of toxin-antitoxin were given. After the second injection the girl was quite ill, her temperature rising to 101°. The third injection caused less disturbance.

The blurred vision was first noted about a week after the third inoculation. It was at its maximum four or five days later. Being satisfied as to the etiology of the trouble, the mother was assured that the condition would wear off and no therapy was advised. When seen one week later 3½ point type was read easily at 12 feet. The explanation of the condition is, apparently, that the excess of toxin over antitoxin in the serum administered was sufficient in a sensitive individual to cause a paresis of accommodation. Other children had been treated with the same stock preparation without toxic symptoms.

JOHN GREEN, JR., EDITOR.

BALTIMORE MEDICAL SOCIETY OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SECTIONS.

JANUARY 22, 1925.

Diagnosis of Diseases of the Internal Ear.

DR. GEORGE MACKENZIE of Philadelphia read this paper.

The Ocular Complications of Chorea.

DR. H. MAXWELL LANGDON of Philadelphia read a paper on this subject, to be published in full in this journal.

Homonymous Hemianopsia Resulting from General Anesthesia.

DR. JONAS S. FRIEDENWALD reported this unusual case. The patient was a tailor, 35 years old. Four years previously his eyes had been examined and only a refractive error noted. For a short time he had had typical gall stone attacks, on account of which he was admitted to the Hebrew Hospital, where a thoro physical and laboratory examination revealed no trouble aside from the gall stones. His heart was normal, Wassermann negative, there was no evidence of arteriosclerosis. Following an otherwise quite uneventful operation for gall stones, the patient complained of difficulty with his vision. Two weeks after the operation the speaker had first seen the patient and found a left homonymous hemianopsia. This condition has persisted unchanged for a year.

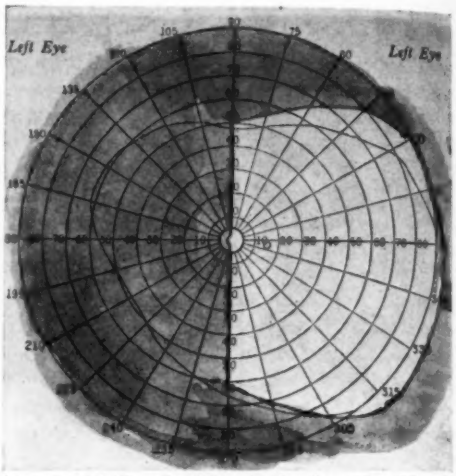

Fig. 1.—Fields of vision in hemianopsia following general anesthesia.

The visual fields of this patient are remarkable in that a small area of vision persists in the extreme upper temporal field of the right eye.

One case of transient hemianopsia following chloroform anesthesia has been

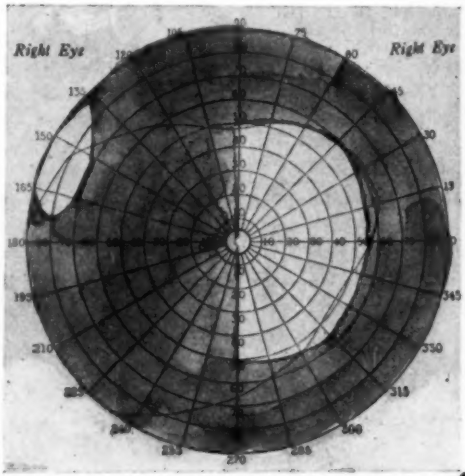

Fig. 2.—Island of retained vision in upper temporal field of right eye Friedenwald's case.

reported by Solomonson (Deutsch. med. Wch. 1900), but this was in a woman of over 45 years. Indeed, no previous case of cerebral vascular accident in anesthesia could be found in which the patient was under 45 years.

JONAS S. FRIEDENWALD, SECY.

THE NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARGYNGOLOGY.

JANUARY 19, 1925.

CHAIRMAN, DR. ROBERT SULLIVAN.

Foreign Body in the Eye.

Dr. E. B. Cayce, presented the case of a white man, 50 years of age, who, while working on a boiler, was struck in the left eye by a small sliver of steel from a chisel. The eye was cut at a position corresponding to between eight and nine o'clock, the cut being 2 mm. in diameter and 2 mm. from the corneoscleral junction. At the time of examination vitreous presented in the wound and was lost with every manipulation of the eye. Ophthalmoscopic examination showed a broad hemorrhagic area towards the nasal side. Steel in the eye, towards the nasal side, was suspected. The X-ray plate showed a foreign body towards the temporal side with Sweet's localizer. Two exposures were taken on the same plate these showing the foreign body in two different positions, proving conclusively that it was inside the eyeball. The following day with the giant magnet the foreign body was removed thru a keratome incision below. Following the operation a massive conjunctival injection of the cyanide of mercury and dionin was given. The vision when tested recently was 3/10. The development of a cataract was expected, but so far as had been made out there has been no change in the lens. Altho the keratome incision was made below, it would be much better when one has to use a keratome, to use it above, as it would be of advantage in case an iridectomy has to be done later.

Discussion. DR. ROBERT J. WARNER thought Dr. Cayce particularly fortunate in that he did not get an injury to the lens. His suggestion in regard to the corneal incision is excellent for the reason that, if an iridectomy is done it will be covered by the lid. He would suggest the injection of milk in this case.

DR. HILLIARD WOOD said: given a piece of steel in the vitreous chamber, it is a question whether it should be brought forward and removed thru the cornea or thru the sclera, especially if it is near the sclera at some point. It has been his custom to draw it forward. But there is always more or less trauma of the front tissues of the eye in that case, and he has sometimes felt that it would be better to take it out thru an opening in the sclera in the rear, altho he has not usually done so. The taking of two exposures with the eye turned in different directions is certainly interesting, as is also Dr. Cayce's suggestion as to making the corneal incision above instead of below. He has always made it below, being led to do so perhaps by the fact that gravity tends to lead the steel below. So far as that is concerned, we can make the incision above and draw the steel up to it. It seemed to him this suggestion is entirely logical.

DR. LESLIE BRYAN said the ideal method for removal would be thru an incision in the cornea at the upper part. And yet this might produce dragging of the ciliary muscle over a greater area if the foreign body were in the lower part of the eye. If this is true, it would be preferable to take it out at the point nearest to the foreign body.

DR. M. M. CULLOM agreed with Dr. Bryan that it is better to go in at the point where the foreign body is. In removing a foreign body from the eye the chances are one might injure the lens; and at the bottom where the foreign body usually is, it can be gotten very easily and with less traumatism. He would be inclined to take them out thru the lower incision.

DR. W. G. KENNON thought that probably our reason for bringing a foreign body thru the anterior chamber is that we are more accustomed to operating on the anterior chamber, i. e., around the lens and iris, and are therefore less fearful than when dealing with vitreous. He believes that we are working on a mistaken basis when we do not go back equatorially in these eyes that have a foreign body in the vitreous. We would get better results with less danger of injury to the lens. Of course it is easier to go thru

the anterior chamber in cases that are suitable, but if we have a perforation of this kind into the eye, without injury to the lens, he believes the logical procedure is to make an opening thru the sclera back of the ciliary body and extract the foreign body.

DR. E. B. CAYCE in closing, said he thought Dr. Warner's suggestion as to the injection of milk good. We have in that a treatment of value, because if it does not do good, it will not do harm. The question of the posterior route and the anterior route has been debated for some time. When he was in Zurich in 1911, Haab came out very strongly in favor of the anterior route. His argument was that if there is cataract, it can be removed; but if there is detachment of the retina or choroidal infection, then the eye is lost.

Cerebellar Tumor Without Ophthalmoscopic Changes.

DR. ROBERT J. WARNER reported the case of M. T., a white girl about 5 years of age. Previous history negative, except for discharge from right ear several years ago. In December, 1924, the patient was in the hospital for five days complaining of her right ear, which was, however, found to be negative. After remaining in the hospital for a few days she was discharged. Following this she developed attacks of severe pain on the right side of the head, more marked back of the right ear, frequently associated with vomiting; unsteady gait, leaving a tendency to fall to the right.

Examination of the right ear showed an old healed scar on the drum. External examination of the eyes was negative at all times, but the nurses reported that the right eye occasionally turned in, immediately following an attack. The pupillary reaction was normal. The fundi were normal. General physical examination negative. Spinal fluid under slight pressure, cell count 72, otherwise negative. Blood Wassermann negative. Neurologic examination negative.

The patient was kept under observation in the hospital for two weeks. The hospital attendants reported that she had three or four attacks daily, but never lost consciousness, and she would throw her hand to the ear as if in great pain. The temperature was normal at all times while in the hospital. The pulse varied from 120 to 140.

On the 14th day of her hospital observation, the patient died following one of these attacks. A postmortem examination showed in the right cerebellum a tumor about the size of a hen's egg. This tumor was reported as a rapidly growing spindle cell sarcoma, originating in the pia arachnoid.

The interesting point in this case is the postmortem finding of a tumor of this size without any localizing signs especially no changes in the fundi, in spite of the fact that the growth was subtentorial.

Discussion. DR. E. B. CAYCE thought this case especially interesting because he had reported to the Society some months ago a case of cerebellar abscess in which there were absolutely no fundus changes.

DR. M. M. CULLOM thought symptoms would have caused choked disc. He would like to know what an X-ray picture would have shown in that case? Was one taken? Was there any history of injury?

DR. W. G. KENNON said the unusual feature in this case was the fact that it was a subtentorial tumor without any choking of the disc whatever.

DR. WARNER in closing said, there was no history of injury and no X-rays were taken.

FRED E. HASTY, EDITOR.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

SECTION ON OPHTHALMOLOGY.

DECEMBER 18, 1924.

Traumatic Rupture of Choroid.

DR. LEIGHTON F. APPLEMAN presented a boy, aged 10 years, with triple rupture of the choroid on the temporal side of the disc, which followed a blow over the right eye two months previously, with a piece of iron 2x2x½ inches. There had been a cut of the lower lid below the inner canthus and of the skin of the brow. The eyeball showed no external evidence of injury, but the pupil was widely dilated and fixed, V=6/60. The largest rupture was situated midway between the disc and macula, extending vertically about the length of two disc diameters, widest at the upper extremity with an irregular outline, and tapering towards its lower

extremity with sharper outlines fringed with pigment. The second was crescentic in shape, parallel with the first, and almost exactly thru the macula about 1.5 disc diameters in length. The third was one disc diameter to the temporal side of the macula and slightly shorter than the others, crescentic and with a narrow fringe of pigment. The disc was normal, as were the remaining portions of the eyeground.

The Kuhnt-Heisrath Operation for Trachoma.

DR. WM. ZENTMAYER presented a case of trachoma upon which a Kuhnt-Heisrath operation had been done, because it was thought that the value of this procedure is not fully appreciated. The patient was in the hospital for eight weeks previously, with routine local treatment but showed little improvement when discharged. A severe exacerbation and pannus resulted and vision was reduced approximately to L.P. in each eye. One week after the operation was performed the patient was able to tell time on a watch, and the pannus had largely disappeared, altho there were still superficial ulcers.

Clinical Cases With Slit Lamp Studies.

DR. LUTHER C. PETER gave the details of four cases studied with the slit lamp. The first case was one of traumatic vitreous hernia in a man of thirty-four years of age, who was struck on the left eye by a nail some weeks ago. V., R. E. = 6/6; L. E. = 6/9 partly. The ophthalmoscope showed fine dust like particles in the pupillary area; a hazy lens; a break in the sphincter muscle down and in; media otherwise clear and fundus normal. The corneal microscope showed the iris sphincter ruptured down and in, and the lens hazy in its lower inner quadrant, the opacities being mostly capsular. There was no appreciable dislocation of the lens. A tongue like protrusion of the vitreous appeared at the inner half of the pupil, sharply outlined, and later covered the entire pupillary space and extended well to the temporal side. After contraction of the pupil by eserin, the hernia diminished in size and became limited to the pupillary space. Tension from 2 to 13 mm. higher than in the right eye, altho not above 25 mm. A point of much interest is how it was possible for the vitreous to break thru the zonular fibers, thru the canal of Petit between the lens and iris, without an appreciable dislocation of the lens.

The second case was a vitreous hernia in a man of sixty-nine years of age, following a spontaneous rupture of the anterior lens capsule, dislocation of the lens nucleus into the anterior chamber, and secondary glaucoma. For eight months the tension varied from 20 to 40 mm. Hg. With microarc lamp illumination, the corneal microscope showed edema of the posterior surface of the cornea, the remnants of a dislocated lens nucleus in the anterior chamber, and an iris which was markedly atrophic. The pupillary space was occupied by a fibrous capsular cataract adherent to the iris, and, protruding thru the rent in the capsule below, a vitreous hernia spread over the entire lower half of the anterior chamber well into the angle. This was studded with myriads of red dust like particles. The eye was enucleated because of the pain.

The third case was one of bilateral senile cataract and bilateral primary glaucoma. The patient, sixty-five years of age, was operated on for cataract by a confrere eight years ago, and has gradually lost his vision in both eyes with the exception now of the lower outer quadrants. Tension, R. E., 26 mm.; L. E., 43 mm. Because of the rapid falling off of vision and the increased tension, cyclodialysis was practiced in each eye. Slit lamp studies before operation revealed, in the right eye, a peculiar formation of after cataract which consisted in clusters of globules attached to one another with small pedicles, the globules being filled with fluid, transparent and in almost constant motion. After cyclodialysis, these clusters of globules were somewhat broken up and covered with a more or less semitransparent membrane. Two months after the cyclodialysis, the slit lamp revealed a shallowing of the chamber in the area of the detachment of the ciliary bodies.

Elschnig, in 1911, reported five cases of this type of after cataract, and thought the globule like formations were due to activity of the epithelium. Another point of interest is evidence that the ciliary body has become reattached to the sclera at so early a date, thus probably indicating one of the reasons for the failure to

obtain permanent results after cyclodialysis.

The fourth case was one in whom was shown an opacity which surrounds the inner quadrant of the peripheral embryonic nuclear zone of the lens. The corneal microscope clearly defines the anterior and posterior layers of the opacity with reference to the anterior and posterior nuclear Y's. The interest in this case centers in the ease with which the corneal microsccpe localizes the particular zone which the opacity occupies, and the ability to determine, with a fair degree of accuracy, the time when the opacity was formed. As this opacity is strictly limited to a particular part of the lens which was formed during intrauterine life, before the more peripheral layers of the lens were laid down, it is probable that this cataract had its origin before, or shortly after, birth.

Case of Pseudoneuritis.

Dr. Warren S. Reese presented a case of pseudoneuritis, exhibiting marked blurring of the disc margins resembling a true neuritis, especially in the left eye, the latter showing slight elevation of the disc. This man was a neurotic Italian who did not speak English, so that satisfactory perimetric and other examinations were impossible. Retinoscopy showed that he had three diopters of hyperopia in each eye, with V., R. E. = 6/21.

Operation for Convergent Squint.

Dr. Reese also exhibited a patient who had been operated upon for a convergent squint of 88 degrees by a recession of the internus of the left, or squinting, eye, which was amblyopic. At the end of ten days there was still a residual squint of 13 degrees in the primary position. A rather peculiar condition existed in that on looking up the visual axes were parallel but as the eyes were carried down they became more and more convergent. He hoped to correct the remaining squint by an advancement of the antagonistic externus and the placing of the sutures so that the line of action of this muscle would be below the horizontal plane and thus help correct the convergence that exists on depression.

Discussion: Dr. Luther C. Peter said that the convergence in the lower field of the squint case exhibited by Dr. Reese, was probably due to force of habit, the converging center still remaining active. As convergence is naturally accomplished in the lower field, it becomes an automatic action on the part of patients, when they fix upon an object near at hand in the lower field.

Dr. Wm. Zentmayer said that Dr. Reese's case was an unusually well-marked one of the type of spurious optic neuritis known as pseudoneuritis striata. The importance of these cases is the differential diagnosis from true papillitis. It rests largely on the absence of distention and tortuosity of the veins and absence of retinal hemorrhages, normal field limits, and persistence without alteration in its appearance.

Dr. H. Maxwell Langdon referred to a boy, aged 12 years, whom he saw some years ago, with hyperemia of both discs, obscuration of the margins, and elevation of the disc level 1.5 D. The vision was normal, there was no hemorrhage, the fields were normal for form and color, and the muscle balance unimpaired. Examination by an internist and neurologist showed no abnormalities.

Dr. de Schweinitz saw the boy in consultation, after he had been under observation for several months without change, and agreed that it was in all probability a pseudopapilledema accompanying a moderate hyperopia of 1.5 D. Altho he said, had he not been under observation for such a long time, he would have made a diagnosis of true papillitis from the appearance of the discs alone. No changes were observed for the ensuing two years during which time he was occasionally seen. So far as he knew the boy had not developed since any general condition which would make this a true papillitis.

Visual Field Studies in Optic Neuritis Secondary to Sinus Disease.

Dr. J. M. Griscom and Dr. M. Monroe reported the details of a case of optic neuritis caused by suppurative ethmoiditis, in which a series of visual fields had been taken over a period of nine months. The fields showed progressive contraction for color and the presence of a paracentral scotoma with a blind spot. The point of main interest concerning these studies was the fact that the progress of the disease toward recovery with two distinct periods of exacerbation was indicated

only by the variation in the color of the scotoma and the enlarged blind spot. It was suggested that probably in most optic nerve affections secondary to sinus disease carefully taken fields will serve as the best and perhaps only guide as to the progress of the disease and so enable the ophthalmologist and rhinologist to take a middle course between necessary radical procedures on one hand, and too long delayed operations on the other.

New Blood Vessel Formation in Vitreous.

DR. HUNTER W. SCARLETT presented a man, aged 26 years, with a projection of new blood vessel formation into the vitreous of the left eye. There was slightly reduced vision in the eye. The mass of vessels proceeded branch like from the temporal edges and side of the disc, and extended into the vitreous about 3 diopters. These gave off smaller branches, which ended in small round convolutions. No supporting fibrous framework could be detected. There was some slight pigment disturbance at the site of origin of these vessels.

OMAHA AND COUNCIL BLUFFS SOCIETY.

Council Bluffs, January 21, 1925.

DR. CLARENCE RUBENDALL, Presiding.

Traumatic Occlusion of Pupil.

DR. D. W. THOMPSON showed a man whose left eye had been injured 45 years ago by a stone. The pupil was occluded and adherent to a large corneal scar. The right eye showed an incipient cataract. It was proposed to do an optical iridectomy on the left eye, it being understood that the prognosis for vision was none too good.

Ophthalmia Neonatorum. Perforation of Corneas.

DR. S. D. MAIDEN showed a baby, both of whose corneas had perforated during an attack of ophthalmia neonatorum. Ten per cent argyrol was used in the eyes at delivery. (Delivery was three weeks premature and dry labor.) Symptoms were first noticed on the third day, when an ulcer of one cornea was already present. Two days later in a convulsion, both corneas perforated and the lens and a good bit of the vitreous was seen hanging from the wound in each eye. Owing to the baby's general condition this was not excised and several days later the vitreous in both eyes had retracted inside the globe. The right eye developed a condition of buphthalmos and was eviscerated. The left eye, however, seven months later, has a surprisingly good appearance; the site of the perforation is hardly visible, the tension feels about normal, and the eye apparently has light perception.

Tucking Operation for Convergent Strabismus.

DR. F. W. DEAN described a modification of the ordinary tucking operation which he performed on a girl of ten years with convergent strabismus. An unusually large tuck was made in the external rectus with chromic catgut. The muscle loop being unusually prominent, each corner of it was included in the conjunctival suture; which produced a decided flattening of the loop and also reinforced the tuck.

Bilateral Cataracts, Macular Degeneration.

DR. DEAN also reported a man of 77, with bilateral cataracts. The projection was good in both eyes. The cataract being mature in the left eye, this was operated on with a good surgical result. A marked senile degeneration of the macula prevented good central vision. A year later the right cataract was mature and was operated on, but the same condition was found. He reported several cases seen in the course of routine refraction where the vision could not be brought up to normal and yet there were no objective findings to account for the loss of vision. In one of these cases a retrobulbar neuritis was present and in several other cases vision improved after treatment directed to arterial hypertension.

Slides for Teaching Purposes.

DR. DEAN showed a series of slides which he used in teaching a class of nurses. The pictures were photographed from different text books, using a graflex fitted with a plus 2 lens. Altho colors were absent the pictures came out very well on the screen.

Mercuric Cyanid Injections in Cataract.

Dr. Dean reported the findings at the last examination in 125 eyes treated with subconjunctival injections of mercuric cyanid, for incipient cataracts in the past few years. Twenty m'g. of 1-5000 mercuric cyanid are injected just back of the equator in each upper fold between the superior and external rectus. This is done under scopolamin-morphin anesthesia.

Of 129 eyes reexamined vision had improved in 88, remained unchanged in 34, and continued to fail in 7. Of 73 cortical cataracts treated vision improved in 60, remained unchanged in 11, and continued to fail in 2. Results were not so good in the nuclear type and it is believed that what improvement did occur was due to clearing up of opacities in the cortex, the nuclear opacity itself being resistant to treatment.

Discussion. Dr. Mullins reported a severe skin eruption with fever following a cyanid injection but no other bad effects were reported by other members.

S. R. Gifford, Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

Meeting of October 20, 1924.

Dr. J. Brown Loring, President.

A Family of Squinters.

Dr. Beulah Cushman presented an entire family of five with very similar eye complaints. The mother had practically the same eye condition for 6 years. She had compound myopic astigmatism of the right eye, which was also amblyopic. The left eye showed compound hyperopic astigmatism. With $+3.25\bigcirc+0.50$ axis 90°, left eye, she read with comfort; right eye improved to 4/10 with a $-0.5\bigcirc -0.5$ axis 30°.

The son, 12 years of age, had a right convergence of 10 degrees. Vision was 5/100 R. E. and 18/100 L. E. With a correction of $+11.25\bigcirc+0.25$ axis 90° in each eye, the vision was raised to 6/10 R. and 8/10 L. and the strabismus was corrected.

The ten year old daughter had a right and left compound hyperopic astigmatism, and strabismus which involved the amblyopic eye. Vision R. 8/10, and L. 10/100. Lenses did not improve her vision and did not straighten the eyes.

The father had a right compound hyperopic astigmatism, R. 12/10, L. 10/100. There was no strabismus. Lenses did not improve the vision. He had not realized that he had defective vision, until he found he could not see with the left eye.

The younger boy had a right and left compound hyperopic astigmatism, and the vision was R. 10/100; L. 10/100. With correction of $+9.25\bigcirc+0.5$ ax. 90° in each eye, the vision was improved to 4/10 R. and 2/10 L. In all cases the fundi were normal; no pigment changes, no changes in macular region, color of disc good. Dr. Suker had also seen these cases. It was concluded that they must be due to hereditary complications—probably a developmental condition. It had been suggested that these children should marry into families who had had good eyes for at least a generation, so that instead of passing on the defect they might pass on good eyes.

Discussion. Dr. G. H. Mundt said that the particular interest in this case was that both father and mother had strabismus. Groups of squinters were not unusual, and he had one under observation at this time, a woman with four children, all with strabismus, the mother also having amblyopia; all highly hypermetropic. He believed it was important to educate parents not to wait until the children were eight or ten years of age before determining the vision. Children as young as eight, ten or twelve months of age with strabismus, were often seen. The time to take care of the squint is when the child is young. The idea is not new, but it bears repeating, because in the hospitals there is an opportunity to discuss the matter with the general practitioner; and he can be made to understand that parents should not wait until the child goes to school to have the vision determined.

Dr. William E. Gamble did not think it reasonable to say that a baby could be refracted before eighteen months or two years of age. The young baby always had more or less incoordination of eye muscles, which condition was normally taken care of

by Nature before the third year. If there is squint at that time, Nature had not done her work well, and only in that case was the ophthalmologist's services needed.

Dr. Thomas D. Allen asked if both parents had a squint.

Dr. Cushman, answering Dr. Allen and closing the discussion, said that the father had no strabismus, and the mother had had some diplopia with near work before she was given glasses. The fact that each eye of each of the children was affected, brought up the question as to whether different eyes being affected in the parents caused the congenital developmental condition in the eyes of each of the offspring.

Congenital Membranous Cataract With Report of a Case.

Dr. E. K. Findlay read this paper published in full A. J. O. p. 216.

Discussion. Dr. Michael Goldenburg spoke of the researches of Professors M. F. Guyer and E. A. Smith. They were able to produce congenital cataracts and reproduce this defect for eight or nine generations by the following procedure: fowls were sensitized to rabbit lens, and the fowl sera was then injected into rabbits advanced to the tenth or fourteenth day of pregnancy. Some of the rabbits died from the treatment and many of the young were killed in utero. Of those that survived, some disclosed opaque lenses, coloboma of the iris, persistent hyaloid artery; and others bluish or silvery color fundus reflex, instead of the characteristic albino reflex. In forty-one controls used, no eye defects were noted. To prove that these defects were not merely the results of placental transmissions, the following experiments were done; these defective eyed males were mated with unrelated strains of females and the defect disappeared, but when females of this generation were mated to defective eyed males the defects reappeared. It was possible to reproduce the defects at will and they had been carried on to the ninth generation. In the later generations the lens defects were more frequent.

Dr. Wm. E. Gamble asked whether these results had been obtained by injections of serum, and upon Dr. Goldenburg's affirmative reply, said that this would seem incompatible with our knowledge of heredity, that acquired characteristics were not transmittable.

Dr. E. V. L. Brown wondered if there was a needling first, then the eye closed for a number of weeks and then another needling. At either one of these procedures something might have been left in the eye—a very small hair could have gotten in.

Dr. E. K. Findlay, answering Dr. Brown, said he put a knife needle in the lower part of the capsule and then decided to do the removal of the whole mass at a subsequent sitting. Very little was done at the first operation. The knife needle was introduced into the capsule, and the mass was found to be movable. Several weeks later the whole mass was removed almost in its entirety.

Sarcoma Originating from Pigmented Nevus of Conjunctiva.

Dr. Francis Lane read a paper to be published later.

Discussion. Dr. M. H. Lebensohn said that from the account of the case given by Dr. Lane, it did not sound like good surgery, there being such a long period of time between the operations. The fault was not with the surgeon, however, but with the patient. He asked if Dr. Brown remembered a similar case which had been under their observation.

Dr. E. V. L. Brown recalled a case in which a growth was stripped from the cornea, and within a week or two it was hardly possible to discern which eye had been operated upon. There was no recurrence.

Dr. Wm. H. Wilder said that whatever view was taken as to the real development of sarcomatous tissue, where pigmented nevus was concerned, either of the skin or of modified epithelial structure such as the conjunctiva, it must always be borne in mind that malignant elements may be present, and that the growth might be carried by metastasis to any distant point thru the cells. Dermatologists, who dealt with these cases more frequently than ophthalmologists, had illustrations of the rapidity of the growth. He recalled a case of multiple melanotic sarcoma some years ago, starting from a pigmented mole on the back, which

had been excised. As the case progressed hundreds of little tumor nodules in the skin could be discerned each day, which had not been visible the day before. At postmortem it was found that almost every organ in the body was affected, so extensive had been the metastases.

In the eye, a suspicious growth might be found at the limbus, with all the appearance of epithelioma, and teachers in ophthalmology have said that careful excision might be justified. Careful examination should be made with a magnifying lens or with the corneal microscope, to determine if possible if pigment is sprinkled thru the tissue, which would probably indicate that it was a connective tissue rather than an epithelial growth.

In one case which he had excised, he had made a report as one of the unusual cases of pigmented epithelioma. It was the belief of Professor Fuchs that all such growths were of connective tissue origin, and hence should be classed as sarcomas. If a portion of the growth was excised for section, it would be well to be prepared with the consent of the patient for a radical exenteration, if the examination showed the growth to be a pigmented sarcoma. Before doing so, however, he would be inclined to give the patient the benefit of treatment with radium. The case which he had recently shown before the Society, of suspected melanotic tumor, had cleared up amazingly upon treatment with radium. It would be impossible to tell that there had ever been any pigmented growth on the eyeball. Some very fine scattered pigment could be seen with a very strong magnifying glass, on the sclera, but otherwise the eye seemed perfectly normal.

Corneal Ulcers.

Dr. George F. Suker reported some clinical observations.

Discussion. Dr. Clarence Loeb took exception to some of Dr. Suker's statements. He himself, after employing ointments for many years, had the greatest confidence in their use in the treatment of ulcers, except those due to a gonococcus infection. He obtained satisfactory results with an ointment composed of iodoform, 1.0; atropin sulphat., 0.2; vaselin alb., 10.0, which was inserted into the conjunctival sac daily, the lids having first been cleansed with a boric acid solution. Some mild cases he had found to clear up in three days, and more severe cases in ten days to two weeks, but the end result had always been the healing of the ulcer and disappearance of the opacity to such an extent, that only in severe cases was any opacity left. He had had no occasion to scrape or cauterize an ulcer, during the past ten or fifteen years.

Dr. Wm. H. Widler thought if a consensus of opinion were taken a good many dissenting voices would be raised to some of the propositions of the speaker. Many valuable methods taught by our forebears, whose observations were certainly as broad and as scientific as many used today, should not be dropped. While therapeutics in the past had been largely empirical, in some respects it is quite as much so today with our serums and vaccines. Some cynic had dubbed the latest foreign protein therapy the acme of scientific empiricism.

Anyone who had ever suffered an abrasion of the cornea knew how grateful it was to have a bland ointment in the eye, such as boracic acid ointment or plain vaseline. And, as in the case of a sprained joint, where it was most comfortable to have it at rest in a splint, so an eye with a corneal ulcer should be placed in a pseudo-splint, namely a comfortable bandage. Rest being one of the most valuable measures employed by the physician, it would seem inadvisable to give up atropin, which in itself was a rest treatment. By producing cycloplegia and putting the ciliary body at rest it certainly influenced the circulation of the eye so that the eye was benefitted. The same was true of emollients to soothe the eye, and with rest given by a proper bandage to keep the lids from moving up and down over the inflamed area, it would seem unnecessary to adopt the radical method of sewing the eyeball in a bag made of its own conjunctiva. He agreed that he would not care to have his eyes treated in that way.

American Journal of Ophthalmology

Series 3, Vol. 8, No. 6 June, 1925

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

EDWARD JACKSON, Editor,
217 Imperial Bldg., Denver, Colo.
M. URIBE-TRONCOSO,
226 W. 70th St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CLARENCE LOEB, Associate Editor,
25 E. Washington St., Chicago, Ill.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.

Original papers, correspondence, and other scientific communications should be addressed to the Editor. Books for review may be sent to any member of the editorial staff. Reports of society proceedings should be sent to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Ill.

Proof should be corrected, and returned within forty-eight hours to the printers. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned. But reprints to contain colored plates must be ordered when the article is accepted.

Copy of advertisements must be sent to the Manager by the fifteenth of the month preceding its appearance.

The annual subscription for the JOURNAL and the OPHTHALMIC YEAR BOOK is eleven dollars, in advance.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to the Manager of Subscriptions and Advertising.

JEAN MATTESON, ROOM 1209, 7 West Madison Street, Chicago, Ill.

TO ERADICATE TRACHOMA.

The writer recently examined a Chinaman who came to America more than 40 years ago; and ever since that time had been treated, more or less regularly, for trachoma. He may have had trachoma when he came, or he may have acquired it from some fellow countryman in one of the labor camps he lived in, after his arrival. The treatment was intermittent and some of it may have been ineffective; but his account of it indicated that it was very similar to what the average of trachoma patients receive from the medical profession.

All the lids were cicatricial and distorted, in one eye most of the lashes of the lower lid were in contact with the eyeball. The conjunctival sacs were greatly shrunken, the palpebral fissures narrow. Both corneas were hazy, and slightly vascular in all parts. His vision was about 5/100 in each eye; and the man is drawing a blind benefit, of twenty-five dollars a month, from the community in which he lives.

Every one who has treated trachoma can recall individual cases in which much better results than these were obtained. We have known three oculists, who acquired the disease in treating patients, two of them in a large ophthalmic hospital, who finally recovered from any active disease and retained standard vision. But they all took steady treatment for from three to five years; and in a fourth instance active manifestations of trachoma had extended over more than ten years, and vision was reduced to about 5/10.

The treatment of the individual case lasts on the average of several years, rarely secures a permanent restoration of the eyes to normal and in the aggregate requires a great deal of personal attention on the part of the oculist. As regards the outcome in the individual treated, no other department of ophthalmic therapeutics gives more meager, uncertain, unsatisfactory results. The case is the exception, and a rather rare exception, in which it can properly be said that we have eradicated trachoma by our therapeutics, and have restored the conjunctiva and lids to a fairly normal condition.

Armies have been most important agencies for the spreading of trachoma. The Napoleonic wars of a century ago, gave it great importance in many parts of Europe. In the world war, trachoma was one of the conditions that had to be looked out for most sharply, among recruits. A medical officer who treated some cases that had been iso-

lated for that purpose, reached the conclusions that "there is no field for this treatment in the army." "Upon return to the wind, smoke, sun and dust of their active army life, these cases quickly relapse." (A. J. O. v. 2, p. 390.) "The efforts to keep it out of the Armies of the United States were fairly successful, probably preventing many thousands of cases. Yet Derby states (A. J. O., v. 2, p. 500) that in the British Army during 1918, there were more than 5,000 soldiers rendered blind by trachoma. In the Prussian Army from 1813 to 1817, from 20,000 to 30,000 men were affected."

But the world war has not been followed by any such diffusion of trachoma as occurred one hundred years before, and this was due to the intelligent methods adopted to prevent its spread. It was brought into France extensively, among the civilian laborers from Egypt and China. Among 100,000 from China there were 8,500 cases of acute infections from trachoma. Arriving in France, however, these men were inspected for trachoma, and divided into three distinct classes. Those free from conjunctival disease were formed into labor companies, that could be sent anywhere and placed under medical officers without ophthalmic experience. Those who had conjunctivitis or presented appearances suspicious of trachoma, were formed into a second class of labor companies; and these, with the men found to have trachoma, were kept under officers with ophthalmic experience, who could give the needed treatment. All cases of trachoma were thus kept isolated from the men with healthy eyes; and in this way service in the expeditionary forces helped to control trachoma, instead of spreading it.

The same plan of separation and treatment of trachoma cases has been successful in schools, hospitals, orphan asylums and civil communities. Over 40 years ago, attention was called to the prevalence of trachoma in orphan asylums in New York City. In some of these the proportion of trachoma cases ran as high as 50 per cent. A campaign of rigid supervision and regular treatment has reduced this proportion in some of the same institutions to 2 or 3 per cent. A little later "trachoma schools" were organized in London, rapidly cutting down the percentage of trachoma, until now there are fewer cases of trachoma in them, than of other conditions requiring special ophthalmic care and supervision. In Egypt, in the schools for the poorer children, 96 per cent had trachoma, but in three years this proportion was cut to 85 per cent, altho the children were still drawn from a population in which trachoma was almost universal. In the government schools of Cairo, the trachoma percentage of 85 in 1884 was diminished to 34 in 1900.

In the United States Public Health Service Report for 1924 is given the results of a recent survey of the situation in Kentucky. While the account of the achievements of the campaign against trachoma in the mountains of that state may make them rather more sweeping and spectacular than the facts warrant, it is shown that results obtained in this region of unfavorable housing conditions and scanty medical service, are quite as striking as those reported elsewhere. In the Knott County district, in 1912, one-eighth of the population had trachoma. In the following 10 years, 740 trachoma patients were treated there. In the recent survey it was found 469 were cured of trachoma, only 12 were found with active trachoma, and the condition of 259 was left in doubt, presumably many of them cured.

Everywhere it has been tried, the plan of hunting out and treating all cases of active trachoma, has resulted in checking the spread and diminishing the frequency of this disease. While the results have not always been brilliantly successful in restoring good vision and freedom from discomfort, to the patients treated, these patients have been benefitted by the treatment that was necessary to prevent them from infecting others. In the army the segregation in companies was essential to control the contacts of the infected, and to keep up the necessary treatment of their eyes. Wherever such treatment can be kept up, steadily, and so long as necessary,

whether for a few months or several years, the good result is the same.

The principal things to be done, to eradicate trachoma are: First, to avoid crowding together of infected and uninfected under conditions favorable for the spread of the disease in army camps and trenches, steerage passage on ships, crowded tenements in cities, and family contacts under poor hygienic conditions, or exposure to wind, dust and insects which may be carriers; Second, to keep every case of active trachoma under local treatment with astringents and antiseptics that certainly eliminate the danger of extending the disease to others; Third, prolonged supervision that shall not be withdrawn, after improvement has been secured by operation or vigorous applications, but shall continue on the alert for recrudescences and relapses, until thoro inspection, after intervals of many months, shows the cure complete and permanent.

E. J.

TRACTION AND SUCTION APPARATUS FOR CATARACT EXTRACTION.

Elsewhere in this Journal, (p. 484), is a note describing a suction apparatus for the removal of soft lens substance from the eye; a method of cataract extraction which the writer points out is not by any means new. If one reads widely and critically, he finds a large part of most medical journals taken up with repeating, or calling attention to, what has been previously published; and this is not the least valuable part of the literature.

Among the contemporaries of Graefe was a German ophthalmologist, Adolf Schuft. Later he changed his name to Waldau. It was in connection with the latter name that his work became more widely known. He suggested in 1860, what was known as Schuft's or Waldau's spoon, for removing the lens, and especially the soft cortex. The instrument was widely commented on and used. Several of his contemporaries suggested improvements in it; chiefly in the direction of making it thinner and less clumsy. Among these improvements were the modifications suggested by Bowman. His lens curette was described in the Royal London Hospital Reports, 1865, v. 4, p. 332. He reported the results obtained with it in 130 cases, and refers in his paper to a different form of lens spoon, used by his colleague, the elder Critchett.

The most radical modification of the lens spoon was the replacing of its bowl by a wire loop; that took less room in the corneal opening and within the eye; and was especially suited to catching and holding the nucleus, or the lens as a whole, and particularly when it was dislocated. The Snellen loop has been quite widely used in many countries. But the best form of loop was proposed by Levis of Philadelphia. He used, instead of bulky German silver, a loop of soft flexible steel wire, that can be sterilized, pressed into the shape desired, easily introduced behind the lens, which it holds securely to the incision, and insures its successful removal.

Removal of soft cataract by suction was suggested 1500 years ago, and was again brought up by Peccholi in 1829. Following the use of the curette, suction was again thought of, for the removal of cataract; and in 1863 several ophthalmic surgeons took it up. The apparatus devised by Teale of Leeds, England, won most general and lasting favor, and became widely known. The instrument described by Dr. Dean is a slight variation of Teale's instrument. It is still mentioned in the text books, (see de Schweinitz, 10th edition, p. 759 or American Encyclopedia of Ophthalmology, v. 1, p. 641) and may often serve a useful purpose. Bowman also suggested a suction apparatus, the suction being made with a small syringe. This was somewhat widely tried, but was found inferior to Teale's, because it was less simple and because the tip was rigidly connected with the syringe. In the later suction instruments of Hulen and Barraquer, the broken up lens substance is not drawn thru the tube, but the partial vacuum formed by suction is used to

seize and hold the lens during its removal.

No instrument should be used in operations on the eyeball until its manipulation has become familiar to the operator, by use on the eyes of lower animals. But such familiarity is not difficult to obtain, and it would seem reasonable for all who undertake the operative removal of cataract, to gain the necessary acquaintance with the wire loop of Levis and suction apparatus like that of Teale. Their use is still an appropriate topic for our discussion.

ESTIMATING VISION IN OPACITIES OF THE MEDIA.

To distinguish cataract from glaucoma, atrophy of the optic nerve, choroidal atrophy or detached retina, was one of the most difficult tasks of the ophthalmic specialist, before the introduction of the ophthalmoscope. Its contribution to the diagnosis of cataract was once supposed to be the most important service this instrument could render in ophthalmology. To decide off hand whether any eye did or did not present a cataract, became relatively easy and certain.

But the usefulness of the ophthalmoscope in the diagnosis of cataract does not end with the recognition of its presence, extent, relative maturity and character. The impairment of vision, that a certain opacity of the lens will cause, can be estimated with approximate exactness by the impairment it causes in the clearness of the ophthalmoscopic picture. The subjective clearness of the patient's vision cannot be exactly compared with the physician's objective data, gathered with the ophthalmoscope. Yet if the latter are habitually observed with care, as to their minute character, and are carefully distinguished from the impression of opacity gotten from the examination by oblique illumination, the ophthalmoscopic evidence will go a long way toward showing how much vision the patient can have, thru a partly opaque lens, cornea or vitreous.

To a moderate extent a kind of scale can be constructed in which a certain lens opacity noted, corresponds to a certain loss of visual acuity; and this approximate correspondence between the ophthalmoscopic picture and the impairment of visual acuity can be taught to the special student of ophthalmology. But the best ability to estimate visual acuity from ophthalmoscopic appearances will always be, like other points in ophthalmoscopic diagnosis, a matter of individual skill, developed by constant effort to see all that can be seen with the instrument, and to think much of the significance of what is thus observed.

One modification of the ophthalmoscopic examination—the shadow test—gives very definite information regarding the share of opacity in the refracting media as a cause of impairment of vision. Certain lens conditions that give an appearance of marked opacity by oblique illumination, permit the observation of movements of light and shadow in the pupil, about as easily as they can be followed thru the clear lens. Such lens conditions, altho "opacities" in a certain sense, are not such as will greatly disturb the acuteness of vision. If one can see the movement of light and shadows in the pupil, from near the point of reversal, he can safely assume that there is no lens opacity present, that greatly interferes with the acuteness of vision.

Moreover with reference to prognosis, the opacities of the media that do not greatly interfere with the definiteness of skiascopy, are generally congenital conditions, that do not progress toward mature cataract; but remain unchanged for many years, and justify a favorable prognosis, however alarming they may appear by oblique illumination, or to a casual glimpse with the ophthalmoscope.

E. J.

ANNOUNCEMENTS FOR LONDON CONVENTION.

A preliminary bulletin of the Convention of English Speaking Ophthalmological Societies, which is to take place in July this year, has already been circulated to the members of such

Societies. A more detailed programme will be issued to all registered members of the Convention towards the end of May. In the mean time announcement is made of the following additional arrangements.

H. R. H. the Duke of Connaught has graciously consented to be present at the Banquet, which is to be held in the Guild Hall in the City of London on Friday, July 17th.

The Scientific meetings of the Convention will be held in the Memorial Hall at University College, Gower Street; and the Registration Office, the Scientific and Business Museums, will be in its Anatomical department.

At the Reception in the evening of Tuesday, July 15th, at the Royal Institution of Great Britain, Sir William Bragg, K.B.E., D.Sc., F.R.S., will deliver an address on "Thomas Young and His Work," at which some of the apparatus actually used by Thomas Young will be shown.

The visits to Institutions of Ophthalmic Interest on the afternoon of Tuesday, July 15th, have been divided up as follows:

1. (a) St. Margaret's Hospital for cases of Ophthalmia Neonatorum.
   (b) The London County Council's Myopia School.
   (c) The Royal London Ophthalmic Hospital, Moorfields.
2. (a) St. Dunstan's.
   (b) The Central London Ophthalmic Hospital.
3. (a) The Royal Westminster Ophthalmic Hospital.
   (b) The Library for the Blind.
4. (a) The Royal Eye Hospital, Southwark.
   (b) The Normal College for the Blind, Norwood.
5. The White Oak Ophthalmia School, Swanley.

The number that can take part in any one of these excursions is limited, and those wishing to participate in them will be requested to fill up and return a form which will be issued with the next programme.

BOOK NOTICES.

The Routine Examination of the Eye. Basil Lang, F.R.C.S., Eng. Assistant Surgeon Royal London Ophthalmic Hospital, etc. Cloth, 12 mo., 156 pages, 30 illustrations. London, Edwin Arnold and Co. New York, Longmans, Green and Co. 1925.

It is often asked what preparation should be made for passing the American Board for Ophthalmic Examinations. Master what is in this little book, is a good answer. It will not be mastered by cramming. How it is to be done is well set forth in the preface. "The student is advised to read this book with the patient in front of him, so that he may be able immediately to examine the part of the eye in question. If a patient be not available two students should read the book together, each examining the eye of the other. The practical application of the method advocated in the book is essential to the memorizing of the details. Understanding them while reading them is entirely insufficient."

Training for ophthalmic practice is still most defective in regard to systematic examination of the patient, by all methods available for accurate diagnosis. A thoro study of this little book, in the way indicated above, will go far toward filling in the gaps left by the usual training. In other words, prolonged clinical studies of a large number of cases along the lines here laid down, will furnish a rather complete well rounded course in clinical ophthalmic diagnosis.

The book is divided into three parts: External Examination; Subjective Examination of the Eyes; and Examination in the Dark Room. In neither of these parts are the corneal microscope, the slitlamp, or ophthalmoscopy with red free light referred to. A lens giving 10 diameters magnification is recommended for the examination by focal illumination; and mirrors of various foci are mentioned for ophthalmoscopy. To test the light sense the method given is simply to compare with that of the surgeon, the patient's ability to recognize test type in a

darkened room; when, after a few minutes adaptation, light is gradually increased until the largest letter is recognized.

In brief this book does not attempt to take the student into the new fields of ophthalmic diagnosis, that are now being explored largely by the use of highly elaborate and expensive apparatus. Even the ophthalmometer is not described. The corneal curvature is to be studied with Placido's disc. What the author does do is to point out clearly the universal opportunities to use the surgeon's senses and the most simple and common apparatus to make a thoro examination of each case encountered in private consulting room, or public clinic.

To indicate how fully its subject is worked out, we take the treatment of examination of the field of vision, as indicated by the subheadings mentioned. These are: To estimate the field of vision with the hands. To plot the field of vision with a perimeter. To plot a scotoma with a perimeter. To plot a scotoma with a Bjerrum screen. And a little farther on we find this: To test with a prism the sight of a lesion in hemianopia. Immediately under the subheading are given, the "requisites." Thus, to test for color vision, these are stated as: "Ishihara's book of colour tests, made up of coloured dots in patterns forming numbers. Holmgren's test wools. Colour lamp."

The value of such a book is determined by the skill and care with which words are chosen and sentences arranged, in setting forth its various directions and instructions; and in this respect it can be most highly commended. Its illustrations are all appropriate and wisely selected. In general they represent apparatus that is not often figured in the text books, a few showing exactly how things are to be done, as how to measure the prominence of the eyeball or how to expose the conjunctiva lining the lower lid.

This book enters a field where there has been a lack of something students have needed, both undergraduate students of medicine and surgery, and graduate students preparing for special practice. Even the experienced ophthalmic surgeon can scarcely read two pages of it without getting some hint that will enable him to make, in a more thoro manner, examinations than he has been practicing for years.

E. J.

American Academy of Ophthalmology and Otolaryngology. Transactions of the Twenty-ninth Annual Meeting, held at Montreal, September, 1924. Clarence Loeb, Editor. Cloth, 572 pages, 110 illustrations and 1 colored plate. Printed for the Academy by Tucker-Kenworthy Co., Chicago.

In this volume, one-half of the 30 papers are addressed especially to ophthalmologists. Three of them have already appeared in this journal, and it might be supposed, that others of superior interest and importance would also have been so published. But even if all the papers read before this meeting of the Academy were already accessible to our readers, the discussions to which such reading gave rise, and only accessible thru this volume, would fully justify having it.

For instance, perhaps the climax of the Montreal meeting was a symposium on papilledema. There were papers by W. R. Parker on the mechanism and Jas. Bordley on the significance to the ophthalmologist; one on papilledema in otolaryngology and another on its significance to the neurologic surgeon by Leon E. White and Gilbert Horrax of Boston. But the discussion, participated in by Ellett of Memphis, Woods of Baltimore, de Schweinitz of Philadelphia, Bousquet of Montreal, Adalbert Fuchs of Vienna and several others, appears here only.

With other subjects, like congenital abduction deficiency, phlyctenular keratoconjunctivitis and the bacteriologic examination of the conjunctival sac, it was much the same. In the most successful meetings the paper is only a foundation on which the discussion can be built; and however elaborate and carefully prepared the paper may be, the occasion will be remembered by those present for the dis-

cussion. The discussions, caught by the stenographers present for that purpose, can only become available thru the published official proceedings of the meeting.

All who were present at the Montreal meeting will value these "Transactions." Still less can those who were not present afford to do without them. E. J.

Public Health Service of the United States. Annual Report for the fiscal year 1924. Hugh S. Cummings, Surgeon General. Cloth, octavo, 310 pages, illustrated. Treasury document No. 2943. Washington. Government Printing Office.

Like other departmental government reports, this one gives evidence of routine, formal organization, statistics, and other indications that much has been done, altho not always what was of greatest importance and interest. In contrast with the general literature of medicine, in which every publication, every investigation, is credited to the writer and worker, the name most prominently placed in this volume is that of the Secretary of the Treasury. The name of the Surgeon General may be found appended, at the end of the report. That of the Asst. Surg. Gen. is placed in small type at the head of the report on Scientific Research, and a few of the workers in other directions receive inconspicuous mention. The suspicion is aroused by this system of ignoring the workers, that one attraction of position in government service may be the opportunity to get reputation thru the work of "subordinates."

Public Health is a very broad subject, and but little of this volume has special interest to ophthalmologists. Some of the work on the eradication of trachoma has been alluded to on p. 498. There are five trachoma hospitals conducted in the states of Kentucky, Tennessee, Georgia, Missouri and Arkansas. There were 51 field clinics held at which 9,910 persons were examined, and 835 operations were performed. Trachoma work has been carried on in conjunction with the Boards of Health of 12 states. A program for Eradication of Trachoma among the Indians has also been entered upon.

Other matters of ophthalmic interest are also claiming the attention of the department, and will be the subjects of special reports to appear in the early future. Among these are "illumination," in Government buildings, and in school rooms and industrial plants. The prevalence of goitre and its prevention by feeding iodin, cancer, food poisoning, malaria, squirrel plague and other epidemic diseases, are also subjects of continual observation. It is a volume invaluable for the local health officer, and of interest to many members of the profession.

The illustrations show the buildings of three Marine hospitals. There is a good table of contents and an excellent alphabetic index. These make the report of especial value as a work of reference. E. J.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Lawson, A. Tints and Their Value, Brit. J. Ophth., March, 1925.

In this contribution the author discusses the reasonableness and unreasonableness of popular opinion relative to the destructive effects of ultraviolet rays on human eyes and the uncontrolled desire to use all sorts of tints for the eyes whether healthy or unhealthy. The eye is constructed so as to allow the rays of ordinary sunlight to pass unimpeded to the retina, whereas all excess of ultraviolet radiation beyond what is present in ordinary sunlight, is excluded by the natural protective qualities of the eye. The cornea and crystalline lens furnish this protection against the chemical action of the

ultraviolet rays. The infrared or heat rays are absorbed largely by the pigment of the iris and choroid.

Practically there are several factors which complicate the situation. 1. The intensity of the light as observed in high altitudes or climates with rarefied atmosphere. 2. The duration of the exposure to high light; the individual's own capacity to endure the light without harm. 3. Glare (a) the reflected light strikes the eye in an unusual manner while the eyes are directed straight or slightly lowered. (b) Light which is over and beyond what we normally experience. 3. Occupation, thus acetylene welders are subject to intense ultraviolet radiation while glass blowers are subject to heat radiation.

By a series of spectroscopic experiments with London smoke, Amber, Fieuzal, Crookes and Peacock Blue of various shades, the author illustrates their relative values with a chart of absorption curves. Crookes A serves as a good protection from ultraviolet radiation while Peacock Blue protects from the red and infrared. The latter has the largest range of protection. Factors to be considered are the depressing effects some tints exercise more than others, and some interfere more than others with the general color scheme. If it is simply shade that is required any tint in common use is approximately of the same value. Two points are stressed, one, the difference in the density of the tint due to the thickness of the glass, second that there is greater uniformity in Crookes glass, for the reason that it is standardized as to quality and thickness. In all other tints there is a marked absence of uniformity.

The wearing of tints for healthy eyes. As harmful ultraviolet radiation does not exist under ordinary circumstances protecting tints are unnecessary. Under unusual circumstances in high glares Fieuzal if properly standardized is probably the best shade with the exception of Peacock Blue, which affords the most protection. Crookes affords a general shade without materially disfiguring and altering the color. The habitual use of tints should be discouraged due to the habit becoming fixed.

The wearing of tints for diseased eyes, or as a prophylactic measure against disease. In glass blowers cataract Fieuzal 5 or Peacock Blue; in ordinary incipient cataract Crookes is very comforting. In active inflammatory disease of the retina and choroid Peacock Blue forms a most valuable kind of treatment.

D. F. H.

Koppanyi, T. and **Baker, C. Eye Transplantation in the Spotted Rat.** Am. Jour. Physiology, 1925, 71, p. 344-348.

In the adult Bombinator, Koppanyi was able to excise the eyeball and replant it into the socket, with retention of normal appearance of the eye and of some vision, as shown by normal color adaptation of the skin, by normal phototaxis, and by the ability to hunt and capture flies. Histologically, these eyes showed, according to Kolmer, the presence of all the retinal layers and regeneration of the optic fibers.

Koppanyi has reported eye transplantations in the spotted rat with recovery of some function and with preservation of the rods and cones in the retina, and with the nerve fibers passing from the papilla to the chiasm as seen by Kolmer. In Baker's and Koppanyi's repetition of these experiments, twenty-five rats were operated on by replantation of the enucleated eyeball back into the orbit and suturing the lids over it. The lids were allowed to remain closed until they separated spontaneously. In twenty, the eyeballs failed to take, and panophthalmitis resulted with sclera and lens alone remaining ultimately in the orbit. In two of the animals one eye apparently "took" in each; altho the eye underwent iridocyclitis with partial phthisis bulbi. The cornea cleared up and the corneal reflex returned. Mobility of the eye was doubtfully reestablished. In two more rats the eyes apparently "took." There had been iridocyclitis with cataract formation but no phthisis. The corneas were

clear, corneal reflex was present, and the eyes could move. In the remaining rat, and in two operated elsewhere, the corneal reflex and the pupillary reaction to light were preserved, and the eyes could move. These rats also showed evidence of vision in that they went from a light to a dark compartment and jumped down from a platform to a table as do normal animals.

The authors conclude:

1. The extirpated eyeballs of the Norwegian spotted rat can be successfully replanted and in a small percentage of cases varying degrees of recovery obtained. (a) In some cases we secured only the clearing up of the cornea and the return of the corneal reflex, the lens remaining opaque and the pupil irregular. (b) After transplantation a vascularization of the cornea appears. This vascularization always disappears in about four weeks. (c) In some cases motility of the eyeball returns. (d) In three cases we observed the return of the reaction of the pupil to light.

2. Three animals with transplanted eyes showed negative phototaxis and positive Waugh test, indicating some return of vision. H. P. W.

Angelucci. Normal and Pathologic Psychology of the Eye. Arch. di Ott., 1924, Vol. 31, p. 1.

The author reviews the theory expounded in former articles according to which life depends on the various and changing relations of the electrons making up the body tissues. It is probable that not only all the vegetative but all the psychic life of animals is due to these reactions. According to the theory which Angelucci proposed in 1920, light and color sensations are due to the dissociation by light of chemical substances present in the retina. In this process electrons are freed and the distribution of these electrons produces the increased acidity, oxidation, etc., which accompany the sensations of light and color. This is analogous to the effect of light on solutions, increasing their conductivity by the dissociation of neutral molecules. The author and his school have given experimental evidence that the electric current produces similar increased acidity and oxidation in the retina of animals. Beside visual sensation the ocular movements depend on similar phenomena of dissociation resulting in greater acid production in the contracting muscles. This contraction in its turn produces definite effects on the brain. From the simplest forms of life to the highest, the visual sensations are of more importance to the psychic life than any others. In our unconscious dream life visual images abound while auditory images such as music rarely occur, as the process of auditory memory is more complicated. Abnormalities in visual sensation are thus attended with special psychic abnormalities or "dispositions." The myope, whose life work and whole mental habitus is colored by working at a short distance has a special disposition. He excells in the exact sciences and handicrafts.

Paintings of myopes are exceedingly exact in design but their colors show certain abnormalities, the result of the greater adaptation of the myopic eye to red and yellow. In the myope there is a hyperfunction of the craniosacral nervous system resulting often in spastic constipation. The child with vernal catarrh has the characteristics of vagotonia. There is apparently some relation between buphthalmos and a neurotonic constitution in these children resulting in the generally excitable character of these patients.

S. R. G.

NEWS ITEMS

DEATH.

Dr. William S. Dennett, New York; aged seventy-six, died March 6th.

Dr. Arthur J. Eagleton, Newark, N. J.; died March 20th of pneumonia.

Dr. John William Lee, Minneapolis; aged forty-nine, died March 11th of pulmonary embolism.

Dr. Fred B. Bogardus, Kalispell, Montana; aged forty-seven, died in March at Spokane, Washington, of erysipelas.

The death of Right Hon. Sir Clifford Allbutt, K.C.B., P.C., at the age of eighty-nine has been reported recently. Allbutt was a pioneer in advocating the importance of ophthalmoscopic examination in cases of general disease.

SOCIETIES.

The Pittsburgh Academy of Medicine, April 7th, gave a symposium on cataract by Drs. Edward A. Weisser, Stanley S. Smith and William C. Meanor.

Drs. George F. Suker and James E. Lebensohn were scheduled to address the Chicago Ophthalmological Society, April 20th, on "Osteomata of the Orbit," with report of cases and stereopticon illustrations.

The Ophthalmologocial and Oto-Laryngological Section of the Cleveland Academy of Medicine held its regular meeting on March 27th. Dr. Samuel Iglauer of Cincinnati gave a paper illustrated with stereopticon views.

The Kansas City Eye, Ear, Nose and Throat Society held its April meeting on the 16th at the Baltimore Hotel, with election of officers and presentation of cases. Papers were read by Dr. A. M. Painter on "Gas," Drs. J. L. Myers and T. S. Blakesley on "Thermotherapy and Diathermy."

The New Orleans Ophthalmological and Oto-Laryngological Society's meetings this year will be held at the Eye, Ear, Nose and Throat Hospital, at 8 p. m., the third Thursday of each month. Dr. Theodore J. Dimitry has been elected president, and Dr. Valentine H. Fuchs, secretary.

At the annual dinner of the New York Alumni Association of Johns Hopkins University, Biltmore Hotel, March 13th, Dr. Frank J. Goodnow, president of Johns Hopkins, said it was expected that the eye clinic to be established on the Wilmer Foundation will be opened in October.

At the stated meeting of the New York Academy of Medicine, March 19th, arranged in cooperation with the section of ophthalmology, a symposium on headache was given, comprising addresses by Dr. George E. deSchweinitz, Philadelphia, on "Ocular Headaches"; Dr. Ross H. Skillern, Philadelphia, on "Headache of Nasal Origin"; Dr. Foster Kennedy, New York, on "Headache from the Viewpoint of the Neurologist," and Dr. Ludwig W. Kast, New York, on "Headache from the Viewpoint of the Internist."

The following program was given at the meeting of the College of Physicians of Philadelphia, on April 16th: Dr. Francis H. Adler (by invitation) "Changes in Aqueous Under the Influence of Certain Drugs." Lantern slides. Dr. H. Maxwell Langdon; 1, "A Case of Perforating Injury of the Ciliary Body"; 2, "Perforating Injury of the Globe—Foreign Body in the Orbit"; 3, "Further Report of Foreign Body in Choroid." Dr. Wm. Zentmayer, "A Case of Osteosarcoma of the Orbit."

September 21 to 26, next, an intensive course of instruction for ophthalmologists, as to spectacles, will be given at the University Eye Clinic in Basel, Switzerland, by Brückner and Hallauer of Basel, Hegner of Lucerne, Erggelet, Henker and von Rohr of Jena. To cover the expense of such course each participant will be required to contribute 50 Swiss francs. Application for the course should be made promptly to the University Eye Clinic, Mittlerestrasse 91, Basel, Switzerland.

PERSONALS.

Dr. Andrew J. Timberman has succeeded Dr. Charles S. Means as head of the eye, ear, nose and throat department of the White Cross Hospital, Columbus, Ohio.

Dr. Conrad Berens, Dr. Ray R. Losey, and Dr. Legrand H. Hardy announce the removal of their offices to 30 East 40th St., New York City, N. Y.

Dr. John W. Croskey, ophthalmic surgeon at the Philadelphia General Hospital since 1901, has resigned, it is reported, in order to devote more time to private practice.

Dr. J. Sheldon Clark of Freeport, Illinois, sailed from New York April 25th for Havre, France. He will visit the eye clinics of Switzerland, France and Germany.

Dr. and Mrs. S. Lewis Ziegler and family, of Philadelphia, will sail on the Leviathan July 4th. After attending the Congress of Ophthalmology Dr. Ziegler will make his usual visit to Nauheim.

Dr. and Mrs. Fredrick Krauss, of Philadelphia, will sail from New York July 22nd to spend the summer abroad visiting mainly France and Switzerland and will return to America about the middle of September.

Dr. Paul J. Sartain, of Philadelphia, will sail on the steamship Minnetonka on July 4th, and after spending the remainder of July in England will visit the continent during August, returning to America early in September.

Dr. William Zentmayer and Dr. Thomas B. Holloway of Philadelphia will sail from Montreal late in June to attend the Ophthalmological Congress in London following which they will motor thru the French Alps and Brittany.

Dr. and Mrs. G. Oram Ring, of Philadelphia, will sail July 4th on the Leviathan. Dr. Ring will attend the Congress of Ophthalmology, and with Mrs. Ring will later visit the continent spending August in the Pyrenees, returning to America early in September.

Dr. and Mrs. J. Hiland Dewey, of Philadelphia, will sail on the steamer Paris, French Line, for London late in June. Following the sessions of the Ophthalmological Congress, Dr. and Mrs. Dewey will spend a portion of the summer in Paris.

Dr. Wm. Campbell Posey, of Philadelphia, will join Dr. Arnold Knapp, of New York, in sailing upon the Minnetonka for London to attend the Congress of Ophthalmology. Dr. Posey will return to America following the congress to spend the remainder of the summer at Watch Hill, Rhode Island.

Dr. William H. Wilmer, Washington, D. C., has accepted the appointment as full time professor of ophthalmology in Johns Hopkins Medical School, Baltimore, and as ophthalmologist-in-chief of the Wilmer Eye Institute, which will be established at the Johns Hopkins Hospital.

Dr. and Mrs. H. Maxwell Langdon, of Philadelphia, will sail for London on the Leviathan, July 4th. Following the Ophthalmological Congress, Dr. and Mrs. Langdon will visit Scotland and France and will sail to America on the 12th of August. Dr. Langdon was recently a guest of honor of the Ophthalmological Society of Baltimore, and by invitation presented a paper before that body upon "The Ocular Complications of Chorea."

Dr. H. W. Woodruff of Joliet, Illinois, gave an Eye Clinic at St. Margaret's Hospital, Kansas City, Missouri, on April 13th, from 9 to 12 o'clock. His program was as follows: 1, Glaucoma with Trephining; 2, Glaucoma Operation—Basal Iridectomy; 3, Two Cataract Operations; 4, Muscle Operation.

A testimonial dinner in honor of Dr. Lucien Howe, Buffalo, was given April 16th, at the LaFayette Hotel, to celebrate his fiftieth year in the practice of medicine. A silver loving cup was presented by fellow members of the Ophthalmologic Club of Western New York, and a packet containing messages sent by friends and associates. Dr. George E. deSchweinitz, Philadelphia, gave a summary of the most notable achievements of Dr. Howe.

Dr. Howard Forde Hansell, of Philadelphia, has resigned the professorship of Ophthalmology of Jefferson Medical College. Dr. Hansell held the chair of Clinical Ophthalmology from 1894 to 1904, and has had the major chair from 1904 to 1925. The trustees of Jefferson College recognizing the distinguished position Dr. Hansell has held in American ophthalmology have unanimously elected him emeritus professor. Dr. Hansell will leave for a summer abroad early in May, and upon his return in the fall will resume his private practice as usual.

MISCELLANEOUS.

The Society for the Relief of the Destitute Blind, New York, received $10,000 by the will of Mrs. Martha Marshall Wysong, of New York.

The establishment of a temporary trachoma hospital at Albuquerque, New Mexico, for the treatment of Indians has been authorized at the Interior Department in line with the campaign started last year, which has had considerable success.

A physical examination to detect communicable disease and physical defects was recently conducted for children who were to be admitted to primary, intermediate and high schools in the Philippine Islands. Among 10,237 children examined 310 had trachoma.

By the will of the late Mrs. Dorcas Knox Braistead, New York, the Manhattan Eye, Ear, Nose and Throat Hospital, New York, and the New York Association for the Blind, share with two other hospitals of that city in receiving one-seventh of the residuary estate.

A tablet in memory of Dr. Thomas Passmore Berens was dedicated, March 28th, at the Manhattan Eye, Ear, Nose and Throat Hospital. Dr. Berens, who died December 28, 1923, was actively identified with the institution for thirty-three years.

In a survey of child workers made by the state industrial commissioner of New York, about half of the children between fourteen and fifteen years of age were found to have physical defects, which were aggravated by the work they were doing. About one-fifth of the children had visual defects.

In the medical report presented to the annual meeting of the Bath Eye Infirmary, Dr. J. Burdon-Cooper called attention to dangers to the optic nerve caused by the use of hair dyes. A warning is needed as very severe trouble may result and eyes have been completely lost owing to this practice. He considers that legislation respecting the sale of poisonous dyes is needed.

The National Committee for the Prevention of Blindness has established a demonstration eye clinic in cooperation with the Clinton Neighborhood Conference, at 413 West Forty-sixth Street, New York, which will be held Wednesday afternoons under the direction of Dr. Henry Robertson Skeel. The National Committee is undertaking this clinic to determine the "sight condition" of an unselected group of preschool children, and to demonstrate what can be done by a neighborhood association in conserving the sight of children.

To give partial sighted children a fundamental education, Philadelphia established, in 1920, conservation of vision classes. Candidates were examined by an oculist, and children having less than 20/70 vision with proper refraction in the best eye were referred to sight saving classes, and those having less than 20/200 vision in the best eye with proper refraction were referred to blind institutions. In all, 272 pupils have been recommended to the sight saving classes by the eye clinic of the department of health. It has been found that the most common causes of loss of vision by children in these classes are progressive myopia and corneal opacities.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-faced type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is in an abstract of the original article. (Bibl.) mean bibliography and (Dis.) discussion published with a paper.

BOOKS.

Deutsche ophthalmologischen Gesellschaft. Heidelberg, 1924. Paper, 340 p., 43 ills., 5 pl., 4 in colors. Munich, J. F. Bergmann. A. J. O., 1925, v. 8, p. 329.

Green, J. and **Ewing, A. E.** Optotypes, consisting of test letters and pictographs for measuring the acuteness of vision. 35 pl. Pub. by C. V. Mosby Co., St. Louis, 1923. A. J. O., 1925, v. 8, pp. 329-330.

Koby, F. E. Microscopie de l'Oeil vivant (microscopy of the living eye). Paper, 240 p., 43 ills., Mason et Cie, Paris, France. A. J. O., 1925, v. 8, pp. 327-328. Med. Jour. and Rec., 1925, v. 121, p. 511.

Török, E. and **Grout, G. H.** Surgery of the eye. 2nd edition, cloth, 510 ills., 101 in colors. Phila. and New York, Lea and Febiger, 1925. A. J. O., 1925, v. 8, pp. 328-329.

DIAGNOSIS.

Kreiker, A. Microscopy of the eyes and the slitlamp. Zeit. f. Augenh., 1925, v. 55, pp. 45-51.

Lemchen, B. Reflex to touching lashes in functional nervous disease. Ill. Med. Jour., March, 1925.

Schiötz, H. Tonometry. (3 tables, 3 ills.) B. J. O., 1925, v. 9, pp. 145-153.

Tobias, G. Ten volt lamp for electric ophthalmoscope. Zeit. f. Augenh., 1925, v. 55, p. 187.

Weber, F. P. Ophthalmoscopic sign of death. Med. Press. and Circ., March 18, 1925, p. 211.

THERAPEUTICS.

Angelucci, D. Antoserotherapy in trachoma and tuberculosis. (12 ills.) Arch. di Ottal., 1925, v. 32, pp. 1-47.

Broeman, C. J. Radium treatment in diseases of eye. Ohio State Med. Jour., 1925, v. 21, pp. 257-264.

Flieringa, H. J. Action of ciliary body under homatropin and cocain. (Dis.) A. J. O., 1925, v. 8, p. 311.

Jocqs, R. Anaphylaxis and injections of milk. Clin. Opht., 1925, v. 29, pp. 65-68.

Rochat, G. F. Action of atropin on pupil dilator. (Dis.) A. J. O., 1925, v. 8, p. 316.

Thometz, H. M. Physiotherapy as applied to Eye, Ear, Nose and Throat. Ill. Med. Jour., 1925, v. 47, pp. 122-125.

Wilson, S. R. Ocular complications in general anesthesia. Lancet, 1925, March 21, p. 629.

OPERATIONS.

Byers, W. G. and **Bruére, A. A.** Routine bacteriologic examination in conjunctival sac. (Dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 141-148.

Psicaine. B. J. O., 1925, v. 9, pp. 189-191.

Terson, A. Indications for relaxation of lids (akinesis). Ann. d'Ocul., 1925, v. 162, pp. 194-196.

PHYSIOLOGIC OPTICS.

Berger, F. Micropsia. (Bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, p. 235.

Borello, F. P. Macro- and micropsia with dissociation of retinal images. (3 ills., bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 130-138.

Mast, S. O. and **Dolley, W. L.** Relation between stimulating efficiency of intermittent and continuous light. Amer. Jour. Phys., 1925, v. 72, pp. 84-89.

Ten Doesschate, G. and **Van Heuven, J. A.** Periodic visibility of peripheral objects during fixation. (Dis.) A. J. O., 1925, v. 8, pp. 316-317.

REFRACTION.

Bourdier, F. Diphtheria bacillus found in paralysis of accommodation. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 107-111.

Clarke, E. Eye as an index to age. Practitioner, 1925, v. 114, pp. 267-273.

Collin. Paresis of accommodation. Clin. Opht., 1925, v. 29, pp. 68-71.

Davis, W. T. Nonrefractive asthenopia. (Bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 40-60.

Duke-Elder, W. S. Changes in refraction in diabetes mellitus. (7 ills., 4 tables, bibl.) B. J. O., 1925, v. 9, pp. 167-186.

Friedenwald, J. S. Sensitive test charts for refraction. (5 ills., bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 222-228.

Goar, E. L. Jackson's cross cylinders. (Dis.) A. J. O., 1925, v. 8, p. 321.

Henker, O. Subjective tests of refraction. (Dis.) A. J. O., 1925, v. 8, p. 315.

Koeppe, L. Diffraction. (Dis.) A. J. O., 1925, v. 8, pp. 314-315.

Kronfeld, P. Postdiphtheritic paralysis of accommodation Zeit. f. Augenh., 1925, v. 55, p. 192.

La Placa, G. Prismatic effect of correcting cylinders. (5 ills.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 230-235.

Strozier, W. Refraction. (Dis.) A. J. O., 1925, v. 8, p. 321.

OCULAR MOVEMENTS.

Aszalos, J. Operation for squint in eye clinic at Debrecen. Zeit. f. Augenh., 1925, v. 55, p. 119.

Banister, J. M. Extrinsic ocular muscles in health and in disease. Reprint from Amer. Jour. of Physiol. Optics, Jan.-Apr., July-Oct., 1924.

Chambers, E. R. Diplopia in encephalitis lethargica. Brit. Med. Jour., 1925, March 14, p. 507.

Favill, J. Mechanism of induced rotary and vertical nystagmus. Arch. of Neurol. and Psychiat., 1925, v. 13, pp. 479-490.

Gifford, H. Congenital abduction deficiency. (Dis. bibl.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 176-194.

Goar, E. L. and **Ralston, W.** Alternating squint, Texas St. Jour. Med., 1925, v. 20, pp. 651-654.

Guist. Free disassociated eye movements. Zeit. f. Augenh., 1925, v. 55, pp. 198-200.

Lesér, O. Development of extraocular muscles in some mammals. (4 ills., bibl.) B. J. O., 1925, v. 9, pp. 154-161.

Orlandini, O. Nystagmus and disturbance of associated eye movements. Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 97-101 and pp. 227-230.

Prakash Chandra Das. Lefthandedness and squint. Indian Med. Gaz., 1925, v. 60, p. 118.

Rowland, W. D. Etiology and treatment of cross eyes. Jour. Ophth. Oto. and Laryngol., 1925, v. 29, pp. 95-102.

Wells, D. W. Value and development of fusion faculty. (5 ills., bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 159-175.

CONJUNCTIVA.

Adamandiades. Oculocardiac reflex with subconjunctival injections. Ann. di Ottal. e Clin. Ocul., 1925, v. 53, p. 190.

Constas. Vitality of Morax diplobacillus in water. Ann. d'Ocul., 1925, v. 162, pp. 201-203.

D'Amico, D. Pemphigus of conjunctiva. (Bibl., 1 pl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 111-130.

Demaria, E. B. Granular conjunctivitis in Argentina. Semana Med., 1925, v. 32, pp. 449-460. Arch. de Oft. Hisp.-Amer., 1925, v. 25, pp. 113-143.

Garcia Mansilla. Parinaud's conjunctivitis. Arch. de Oft. Hisp.-Amer., 1925, v. 25, p. 152.

Griffith, A. D. Conjunctivitis and its treatment. Clin. Jour., 1925, March 18, p. 127.

Howard, H. J. Epithelial phagocytosis. A. J. O., 1925, v. 8, pp. 331-332.

Hudson, C. Gonorrheal affections of eye. (Dis.) Lancet, April 4, 1925, pp. 717-718.

Jackson, E. Epithelial phagocytosis. A. J. O., 1925, v. 8, pp. 324-326.

Kalt. Lichen conjunctivitis. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., p. 100.

Lauber. Treatment of ophthalmoblennorrhea. Wien. klin. Woch., 1925, v. 38, p. 362.

Lavat. Syphilitic chancre of culdesac. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 117-119.

Lindner, K. Epithelial phagocytosis. A. J. O., 1925, v. 8, pp. 330-331.

Diphtheria and gonoblennorrhea. Wien. klin. Woch., 1925, v. 38, p. 267.

McKee, S. H. Epithelial phagocytosis. A. J. O., 1925, v. 8, p. 333.

Marin, Amat. Treatment of spring catarrh with radium. Arch. de Oft. Hisp.-Amer., 1925, v. 25, p. 150.

Morse, S. Roseola of the conjunctiva. J. A. M. A., 1925, v. 84, pp. 1256-1258.

Pascheff, C. Epithelial phagocytosis. A. J. O., 1925, v. 8, pp. 332-333.

Thirion. Subconjunctival injections of cyanid of mercury in treatment of trachoma. Paris thesis, 1925.

Vega, E. de la. Trachoma in the Argentine Republic. Semana Med., 1925, v. 32, pp. 639-652.

CORNEA AND SCLERA.

Benedict, W. L. Etiology and treatment of scleritis and episcleritis. (Bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 211-221.

Blair, W. W. Etiology of phlyctenular keratoconjunctivitis. (9 charts, bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 195-210.

Brewerton, E. Postoperative result of conical cornea. Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 309.

Byers, W. G. Traumatic keratitis in the new born. (Bibl.) B. J. O., 1925, v. 9 pp. 162-166.

Crisp. W. H. Interstitial keratitis. (Dis.) A. J. O., 1925, v. 8, p. 320-321.

Godard, M. Keratoconus and its treatment Paris thesis, 1925.

Merigot de Treigny and **Isnel, R.** Forms of keratitis. (1 ill.) Ann. d'Ocul., 1925, v. 162, pp. 184-194.

Mylius, K. Holocain opacity of cornea. Zeit. f. Augenh., 1925, v. 55, pp. 133-137.

Nida. Rodent ulcer of cornea. Ann. d'Ocul., 1925, v. 162, pp. 178-184.

Thomas, F. Marginal dystrophy of cornea. (Dis.) Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 310.

Verhoeff, F. H. Cause of keratitis after gasserian ganglion operations. (Bibl.) A. J. O., 1925, v. 8, pp. 273-275.

Young, C. A. Electrothermophore in treatment of corneal ulcers. (Bibl., 3 tables.) A. J. O., 1925, v. 8, pp. 293-300.

ANTERIOR CHAMBER AND PUPIL.

Adler, F. H. Demonstration of normal and abnormal pupillary reflexes. (2 tables, bibl.) A. J. O., 1925, v. 8, pp. 287-289.

THE UVEAL TRACT.

Cruise, R. Gradual disappearance of cysts of iris. Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 309.

Edeskuty, O. Primary iris necrosis. Zeit. f. Augenh., 1925, v. 55, pp. 38-45.

Guggenheim, I. Partial ectopia of pupil, superficial iris coloboma and congenital ectropium uveae, as hereditary anomalies. (2 ills.) Zeit. f. Augenh., 1925, v. 55, pp. 161-164.

Kronfeld, P. Dark spots in fundus in myopia. Zeit. f. Augenh., 1925, v. 55, pp. 193-196.

LaRue, C. L. Choroiditis. (Dis.) A. J. O., 1925, v. 8, p. 320.

Lodato. Atrophy of iris in tabes. Arch. d'Opht., 1925, v. 42, p. 179.

Viner. Bilateral uveoparotitis. Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 309.

Zeeman, W. P. C. Retina and optic nerve in iridocyclitis. (Dis.) A. J. O., 1925, v. 8, pp. 317-318.

SYMPATHETIC DISEASE.

Fliri, A. Sympathetic disease. Zeit. f. Augenh., 1925, v. 55, pp. 27-38.

GLAUCOMA.

Castresana, A. Sclerotic fistula after Lagrange operation as seen by slitlamp. Tribuna Med. Espanola, Feb., 1925, pp. 27-31. Clin. Opht., 1925,.v. 29, pp. 71-82.

Genet. Acute traumatic glaucoma. Ann. d'Ocul., 1925, v. 162, p. 211.

Jones, J. G. Glaucoma. Texas State Jour. Med., 1925, v. 20, pp. 596-600.

Lagrange and **Beauvieux.** Pathologic anatomy of glaucomatous excavation. (2 col. pl., 4 ills., bibl.) Arch. d'Opht., 1925, v. 42, pp. 129-144.

Sallmann. Injury to Descemet's membrane in glaucoma operation. Zeit. f. Augenh., 1925, v. 55, pp. 200-202.

Sedan, J. Infantile glaucoma and buphthalmos after injury. Ann d'Ocul., 1925, v. 162, pp. 192-201.

Worms, G. and **Pesme, J.** Infantile glaucoma syndrome after injury. Bull. de la Soc. d'Opht. de Paris., 1925, Feb., pp. 81-84.

THE CRYSTALLINE LENS.

Borello, F. P. Preparatory iridectomy in cataract operation. Ann. di Ottal. e Clin. Ocul., 1925, v. 53, p. 259.

Cantonnet. Morgagnian cataract. Clin. Opht., 1925, v. 29, p. 109.

Fuchs, E. Hemorrhage in eye after cataract extraction. Zeit. f. Augenh., 1925, v. 55, p. 191.

Greenwood, A. Nonoperative treatment of cataract. (Dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 125-140.

Heine, L. Tetany and myotonia cataract. Zeit. f. Augenh., 1925, v. 55, pp. 1-16.

Hogshead, J. McC. Operative technic in cataract operations. Jour. Tenn. State Med. Assn., 1925, v. 17, p. 326.

Jackson, E. Indications for cataract removal. A. J. O., 1925, v. 8, pp. 322-324.

Kirkpatrick, H. Primary cataract. Tr. Am. Acad. Ophth. and Oto-Laryngol., 1924, pp. 61-76.

Nonay, T. Primary abscess of lens. Zeit. f. Augenh., 1925, v. 55, p. 118.

Wheeler, J. M. Secondary cataract opening by single straight incision. Iridotomy by same method. (Dis., 5 ills.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 149-158.

THE VITREOUS HUMOR.

Seaman, G. E. and **Haessler, F. H.** Fibrosis and vascularization of blood in vitreous. (2 ills., bibl.) A. J. O., 1925, v. 8, pp. 289-292.

THE RETINA.

Bane, W. M. Opaque nerve fibers. A. J. O., 1925, v. 8, p. 319.

Bollack, J. Progressive family degeneration of macula. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 77-81.

Calogero, A. Idiopathic hemeralopia. Ann. Ottal. e Clin. Ocul., 1925, v. 53, pp. 185-187.

Frigerio, A. Family retinitis pigmentosa. Arch. d'Opht., 1925, v. 42, p. 177.

Grimminger, W. Hypoplasia of fovea centralis. (11 ills., bibl.) Zeit. f. Augenh., 1925, v. 55, pp. 144-161.

Kalt and **Bailliart.** Atrophic chorioretinitis. Bull. de la Soc. d'Opht. de Paris, Feb., 1925, p. 71.

Kalt and **Nida.** Bilateral obliteration of retinal artery with 15 days interval. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 84-86.

Lebbetter, T. A. Amaurotic idiocy non-Semitic parentage. Canadian Med. Assn. Jour., 1925, v. 15, pp. 367-370.

McMullen. Recurrent retinal hemorrhages. Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 309.

Müller, P. Traumatic retinal pigmentation. Zeit. f. Augenh., 1925, v. 55, p. 192.

Solis-Cohen, S. and **Weiss, E.** Dystrophia adiposogenitalis with atypical retinitis pigmentosa. Amer. Jour. Med. Sc., 1925, v. 159, pp. 489-505.

Wibaut, F. Pathologic fundus picture of Purtscher. (Dis.) A. J. O., 1925, v. 8, p. 313.

TOXIC AMBLYOPIAS.

Jones, C. P. Toxic blindness. Va. Med. Mo., 1925, v. 51, p. 773-776.

Lacat, C. Optic atrophy and arterial spasm due to quinin. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 97-100.

THE OPTIC NERVE.

Abadie, C. Optic nerve atrophy consecutive to spasm of central retinal artery. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 86-97.

Batten, R. Cyst of optic sheath or hole in optic disc. (1 ill., dis.) Pro. Royal. Soc. Med. Sec. on Ophth., 1925, v. 18, p. 23.

Bordley, J., Jr. Significance of papilledema to ophthalmologist. Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 82-88.

Levy, A. Papilledema in a myope. Royal Soc. of Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 310.

Libby, G. F. Opaque nerve fibers and hyaloid remains. (Dis.) A. J. O., 1925, v. 8, p. 318.

Mann, I. C. Leber's atrophy. Royal Soc. Med., Sec. on Ophth., Dec. 1924. A. J. O., 1925, v. 8, p. 310.

Mauksch, H. Family hereditary optic nerve atrophy. Zeit. f. Augenh., 1925, v. 55, pp. 196-198.

Mingazzini, G. Syphilitic optic neuritis. Arch. d'Opht., 1925, v. 42, p. 178.

Parker, W. R. Mechanism of papilledema. Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 77-81.

Rawson, R. D. and **Adrogué, E.** Optic neuritis in sinus and ethmoid disease. Semana Med., 1925, v. 32, p. 480.

Rollet and **Colrat.** Papillary edema in pseudocerebral tumor. Ann. d'Ocul. 1925, v. 162, p. 211.

Strader, G. L. Retrobulbar neuritis or recurrent hemorrhage. (Dis.) A. J. O., 1925, v. 8, pp. 319-320.

Vincentiis, G. de. Rhinogenous optic neuritis. Arch. d'Opht., 1925, v. 42, p. 173.

Wright, R. E. Emphysema of sphenoid with optic neuritis and postpapillitic atrophy. Brit. Med. Jour., March 28, 1925, p. 597.

VISUAL TRACTS AND CENTERS.

Beckershaus, F. The hypophysis and visual fields in pregnancy. (Bibl.) Zeit. f. Augenh., 1925, v. 55, pp. 181-187.

Bruner, W. E. Tumor of pituitary body with unusual changes in fields. (7 ills.) A. J. O., 1925, v. 8, pp. 279-283.

Hessburg, R. Binasal hemianopsia. (4 ills.) Zeit. f. Augenh., 1925, v. 55, pp. 51-58.

Hine, M. Pituitary tumor. (Dis.) Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925. v. 8, p. 310.

McMullen. Lower half of field of vision lost in one eye. Royal Soc. Med., Sec. on Ophth., Dec., 1924. A. J. O., 1925, v. 8, p. 309.

Magnus, V. Fields in tumor of hypophysis treated by Roentgen ray. Tr. Med. Selskab. Kristiania, 1924, p. 102.

Nusu, S. Bilateral hemianopic scotoma, with syphilis and Vasquez' disease. Arch. d'Opht., 1925, v. 42, p. 181.

Rochon Duvigneaud, A., Bourdelle, E., and **Dubar, J.** Apparatus for determining the anatomic visual field by the transcleral image method. Acad. d. Scien., Feb., 16, 1925.

Roelofs, C. O. Location of visual field and field of regard. (Dis.) A. J. O., 1925, v. 8, pp. 311-313.

Sabbadini, D. Scintillating scotoma. Arch. d'Opht., 1925, v. 42, p. 179.

Villard, H. Treatment of hypophysis tumor with deep radiotherapy. (Bibl.) Arch. d'Opht., 1925, v. 42, pp. 146-161.

COLOR VISION.

Farakas, A. Acuteness of color vision. Zeit. f. Augenh., 1925, v. 55, p. 115.

Lawson, A. Tints and their value. (2 ills., 1 col. ill., dis.) Pro. Royal Soc. Med., Sec. on Ophth., 1925, v. 18, pp. 24-34.

Maggiore, L. Simultaneous color contrasts. (4 ills., bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 193-227.

THE EYEBALL.

Blind persons in England and Wales. Lancet, 1925, March 21, p. 634.

Coulomb. Artificial eyes. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., p. 75.

McGuinness, E. J. Bilateral microphthalmia. (Dis.) Med. Jour. of Australia, March 21, 1925, p. 295.

Wright, R. E. Method of adapting an artificial eye to a normal or reconstructed socket. Indian Med. Gaz., 1925, v. 60, p. 120-122.

THE LACRIMAL APPARATUS.

Basterra Santa Cruz, J. Dacryocystorhinostomy. Tribuna Med. Espanola, 1925, Feb., p. 4-19.

Heckel, E. B. Nonsurgical treatment of dacryocystic blennorrhea. (Dis.) Atlantic Med. Jour., 1925, v. 27, p. 445.

Mann, I. C. Treatment of lacrimal obstruction. Lancet, April 11, 1925, p. 781-783.

Morax, V. and Valière-Vialeix. Reconstruction of lacrimal passages with epidermic skin graft. (3 ills.) Ann. d'Ocul., 1925, v. 162, p. 161-178.

DISEASES OF THE LIDS.

Blascovics, L. v. Inversion of lid cartilege. Zeit. f. Augenh., 1925, v. 55, p. 120.

Cruise, R. Modified Motais operation. (Dis.) Royal Soc. Med., Sec. on Ophth., Dec. 1924. A. J. O., 1925, v. 8, pp. 309-310.

Karkarey, P. B. Traumatic ptosis. Indian Med. Gaz., 1925, v. 60, p. 126.

Marks, E. O. Jaw winking. (Dis.) Med. Jour. of Australia, March 21, 1925, p. 294.

DISEASES OF THE ORBIT.

Citelli, S. Orbital complications in frontal sinusitis. Arch. d'Opht., 1924, v. 42, p. 174.

Enroth, E. Swelling of upper lid, early sign of Graves' disease. Abst., Clin. Jour., 1925, March 25, p. 139.

Forrigiani and **Pereyra.** Differential diagnosis between exophthalmos and chronic retroorbital abscess. Arch. d'Opht., 1925, v. 42, p. 174.

Sisson, R. J. Bilateral acute serous tenonitis. (3 ills., bibl.) A. J. O., 1925, v. 8, pp. 276-278.

Stuart, E. G. Encephalomeningocele. (1 ill.) Lancet, March 28, 1925, p. 659.

INJURIES.

Bane, W. M. Penetrating steel fragment. (Dis.) A. J. O., 1925, v. 8, p. 319.

Bivona, S. Granuloma of lid from embedded beard of grain. Ann. di Ottal. e Clin. Ocul., 1925, v. 53, p. 258.

Brown, E. J. Traumatic aniridia. A. J. O., 1925, v. 8, p. 308.

Franklin, W. S. and **Cordes, F. C.** Three cilia in anterior chamber following trauma. (1 ill.) A. J. O., 1925, v. 8, pp. 306-307.

Herriman, L. L. Copper in posterior wall of eye. (Dis.) A. J. O., 1925, v. 8, pp. 318-319.

Lapat, W. Extraction of foreign bodies. (Dis.) A. J. O., 1925, v. 8, p. 321.

Mauksch, H. Radium injury to corneal epithelium. Zeit. f. Augenh., 1925, v. 55, p. 189.

Paderstein, R. Magnet extraction. Zeit. f. Augenh., 1925, v. 55, pp. 137-144.

Sharpe, O. A. Cilia in anterior chamber. (Bibl.) A. J. O., 1925, v. 8, pp. 301-306.

Spectacles and cancer. Lancet, April 11, 1925, p. 776.

TUMORS.

Engman, M. F. and **Kimbrough, J. S.** Early treatment of epithelioma about orbit. Ill. Med. Jour., 1925, v. 47, pp. 212-218.

Hoffmann, W. Plasmoma of eye. (4 ills., bibl.) Zeit. f. Augenh., 1925, v. 55, pp. 164-181.

Jacobs, A. W. Vascular nevus in an infant treated with radium. (2 ills.) Med. Jour. and Rec., 1925, v. 121, p. 494.

Kafka, P. Partial melanosis of eyeball. Zeit. f. Augenh., 1925, v. 55, p. 191.

Morax, V. Pigment epithelioma and sarcoma of iris. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 102-106.

Morelli, E. Large neomelanotic tumor of bulbar conjunctiva. (Bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 101-111.

Mulock Houwer, A. W. Epibulbar sarcoma. (Dis.) A. J. O., 1925, v. 8, pp. 313-314.

Peterfi, M. Intraocular sarcoma with uveitis. Zeit. f. Augenh., 1925, v. 55, p. 118.

Scoccianti. Symmetric bilateral teratoma of conjunctiva. (2 ills.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 256-258.

Trettenero, A. Radiotherapy of sarcoma of orbital cavity. (3 ills. bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 174-184.

Wright, R. E. An orbital growth. A. J. O., 1925, v. 8, p. 308.

GENERAL PATHOLOGY.

Magitot and **d'Autrevaux.** Aqueous humor in ocular pathology. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., pp. 111-117.

GENERAL AND EXTRAOCULAR DISEASES.

Avinier. Acute leucemia with ocular neuroses. Ann. d'Ocul., 1925, v. 162, pp. 203-206.

Barnhill, J. F. Minor and major neuralgias of head. (16 ills., bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 9-89.

Bascou. Septicemia of buccodental origin. Paris thesis, 1925.

Bielschowsky. Ocular symptoms in lethargic encephalitis. Clin. Opht., 1925, v. 29, p. 115.

Cattaneo, D. Bismuth in ocular syphilis. (6 ills., bibl.) Ann. di Ottal. e Clin. Ocul., 1925, v. 53, pp. 138-173.

Davis, W. F. Ocular neurosis. (Dis.) Southern Med. Jour., 1925, v. 18, pp. 300-304.

Francis, L. M. Borderline cases of ophthalmology and rhinology. Southern Med. Jour., 1925, v. 18, pp. 305-308.

Harman, N. B. Syphilitic eye conditions. (1 table.) Lancet, April 4, 1925, p. 717.

Heine, L. Ocular diseases in children's eyes. (9 ills.) Abhandl. Kinderheilk. u ihren Grenz., 1925, Ht. 6, pp. 1-52.

Horrax, G. Significance of papilledema to neurologic surgeon. (2 tables, bibl., dis.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 103-121.

Marzio, O. di. Ocular symptoms in serous meningitis. Arch. d'Opht., 1925, v. 42, p. 176.

Morris, E. McC. Transitory amaurosis from diseased tooth. Eclectic Med. Jour., 1925, v. 85, p. 181.

Ostermeyer, W. Diplopia in dreams. Med. Jour. Australia, 1925, v. 1, p. 249.

Parker, W. R. Ocular manifestations of diabetes. (Bibl.) A. J. O., 1925, v. 8, pp. 284-287.

River, J. P. de. Ophthalmic signs in diseases of the nervous system. (Bibl.) Med. Jour. and Rec., 1925, v. 121, p. 453-456.

Rossi. Ocular troubles with adenoids. Arch. d'Opht., 1925, v. 42, p. 174.

Valière. Study of sensorial ocular troubles. Paris Thesis, 1925.

White, L. E. Papilledema in oto-laryngology. (Bibl.) Tr. Amer. Acad. Ophth. and Oto-Laryngol., 1924, pp. 89-102.

Blindness from teeth, tonsils and sinus disease. The Laryngoscope, 1925, v. 35, pp. 217-227.

PARASITES.

Aubaret and **Margaillan.** Subconjunctival filaria. Bull. de la Soc. d'Opht. de Paris, 1925, Feb., p. 107.

COMPARATIVE OPHTHALMOLOGY.

Landolt, M. Chromatic sense in fishes. Arch. d'Opht., 1925, v. 42, pp. 162-171.

OPHTHALMIC SOCIOLOGY.

Action for injury to eye in administering an anesthetic. J. A. M. A., 1925, v. 84, p. 1226.

Frese. Causes of blindness in 849 young eyes, etc. Clin. Opht., 1925, v. 29, p. 111.

Jackson, E. Blind benefits in Colorado. A. J. O., 1925, v. 8, p. 318.

Visual requirements of motor drivers. B. J. O., 1925, v. 9, pp. 187-189.

Visual standards for auto drivers. Atlantic Med. Jour., 1925, v. 28, pp. 459-460.

EDUCATION, HISTORY AND INSTITUTIONS.

Libby, G. F. and **Finnoff, W. C.** Royal London Ophthalmic Hospital. A. J. O., 1925, v. 8, pp. 326-327.

MacCallan, A. F. Ophthalmology in Egypt. Brit. Med. Jour., March 21, p. 551.

Rochat, G. F. Examinations in ophthalmology. A. J. O., 1925, v. 8, p. 313.

Sir Anderson Critchett. A. J. O., 1925, v. 8, pp. 333-334.